Record of Decision
for
Site 3 - New Source Area Soil (OU3)

Naval Submarine Base New London
Groton, Connecticut

Department of the Navy
Engineering Field Activity Northeast
Naval Facilities Engineering Command
Lester, Pennsylvania

Contract Number N62467-94-D-0888

Contract Task Order 0841

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LIST OF ACRONYMS

AET	Apparent Effects Threshold
ARAR	Applicable or Relevant and Appropriate Requirement
Atlantic	Atlantic Environmental Services, Inc.
B&RE	Brown & Root Environmental
BGOURI	Basewide Groundwater Operable Unit Remedial Investigation
BHC	1,2,3,4,5,6-Hexachlorocyclohexane
CCME	Canadian Council of Ministers of the Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CGS	Connecticut General Statues
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CTDEP	Connecticut Department of Environmental Protection
CTE	Central tendency exposure
DDD	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane
DDE	1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene
DDT	1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane
DDTR	Total DDT isomers
DGI	Data Gap Investigation
DPT	direct push technology
DRMO	Defense Reutilization and Marketing Office
EEQ	Ecological effects quotient
EPA	United States Environmental Protection Agency
ERA	Ecological Risk Assessment
ERL	Effects Range Low
ERM	Effects Range Medium
ESQD	Explosive Safety Quantity Distance
ETPH	Extractable Total Petroleum Hydrocarbons
FFA	Federal Facilities Agreement
FFS	Focused Feasibility Study
FS	Feasibility Study
GAC	Granular Activated Carbon
HHRA	Human health risk assessment
HI	Hazard index
HQ	Hazard quotient
HSWA	Hazardous and Solid Waste Amendment of 1984

ICR	Incremental Cancer Risk
IR	Installation Restoration
LDR	Land Disposal Restrictions
LEL	Low Effects Level
mg/kg	milligrams per kilogram (parts per million)
MHSPE	Ministry of Housing, Spatial Planning and Environment
NAVD	North American Vertical Datum
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NSA	New Source Area
NSB-NLON	Naval Submarine Base - New London
O&M	Operation & Maintenance
OBDA	Overbank Disposal Area
OBDANE	Overbank Disposal Area Northeast
ORNL	Oak Ridge National Laboratory
OU	Operable Unit
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEC	Probable Effects Concentration
POTW	Publicly-owned treatment works
PPE	Personal protective equipment
PRG	Preliminary Remediation Goal
RA	Removal action
RAB	Restoration Advisory Board
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act
RCSA	Regulations of Connecticut State Agencies
RfD	reference dose
RG	Remedial Goal
RI	Remedial Investigation
RME	Reasonable maximum exposure
ROD	Record of Decision
RSR	Remediation Standard Regulations (Connecticut)
SARA	Superfund Amendments and Reauthorization Act
SB	soil borings
SdSL	Sediment screening level

SdSV	Sediment screening value
SEL	Severe Effects Level
SQG	Soil Quality Guideline
SSL	Soil Screening Level
SSSL	Surface soil screening level
SSSV	Surface soil screening value
SVOC	Semivolatile organic compound
TAG	Technical Assistance Grant
TAL	Target Analyte List
TBC	To Be Considered
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity characteristics leaching procedure
TCRA	Time-Critical Removal Action
TEC	Threshold Effect Concentration
TPH	Total petroleum hydrocarbons
TRC	Technical Review Committee
TtNUS	Tetra Tech NUS, Inc.
TW	Temporary well
U.S.C.	United States Code
USGS	United States Geologic Survey
VOC	Volatile organic compound
µg/kg	micrograms per kilogram (part per billion)

GLOSSARY OF TECHNICAL TERMS

This glossary defines terms used in this Record of Decision (ROD). The definitions apply specifically to this ROD and may have other meanings when used in different circumstances.

Administrative Record File: A file that contains all information used by the lead agency to make its decision in selecting a response under CERCLA. This file is to be available for public review, and a copy is to be established at or near the site, usually at one of the information repositories. Also, a duplicate is filed in a central location, such as regional or state office.

Applicable, or Relevant and Appropriate Requirements (ARARs): The federal and state environmental rules, regulations, and criteria that must be met by the selected remedy under Superfund.

Carcinogen: A substance that may cause cancer.

Chemical of Concern (COC): A regulated chemical that is present at a concentration deemed to pose an unacceptable risk to human health or the environment, taking into account the acceptable level or risk land-use definitions (i.e., current and reasonable potential future), and exposure scenario (i.e., completed pathways).

Chemical of Potential Concern (COPC): A chemical identified as a potential concern to human health or the environment through a screening-level assessment because its concentration exceeds regulatory criteria.

Comment Period: A time during which the public can review and comment on various documents and actions taken, either by the Navy, EPA, or CTDEP. For example, a comment period is provided when EPA proposes to add sites to the National Priorities List. A minimum 30-day comment period is held to allow community members to review the Administrative Record file and review and comment on the Proposed Plan.

Community Relations: The Navy and NSB-NLON program to inform and involve the public in the Superfund process and respond to community concerns.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601 et seq.: A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA), Public Law 99-499. The act created a special tax that goes into a trust fund

to investigate and clean up abandoned or uncontrolled hazardous waste sites. Under the program, EPA can do either of the following:

- Pay for site cleanup when parties responsible for the contamination cannot be located or are unwilling to perform the work.

- Take legal action to force parties responsible for site contamination to clean up the site or pay back the federal government for the cost of the cleanup.

Connecticut Remediation Standard Regulations (RSRs): Connecticut regulations (Sections 22a-133k-1 through 3 of the Regulations of Connecticut State Agencies) concerning the remediation of polluted soil and groundwater.

Contaminants: Any physical, biological, or radiological substance or matter that, at a certain concentration, could have an adverse effect on human health and the environment.

Data Gap Investigation (DGI): A follow-up investigation performed to address data gaps identified in the results of previous investigation.

Decision Document: An official document that describes the selected remedy for a site. The Decision Document documents the remedy selection process and is issued by the Navy following the public comment period and state concurrence.

Ecological Risk Assessment (ERA): Scientific method to evaluate the effects on ecological receptors to exposure to contaminants in site-specific medium (e.g., soil, groundwater, etc.)

Excavation: Earth removal with construction equipment such as a backhoe, trencher, front-end loader, excavator, etc.

Extractable Total Petroleum Hydrocarbons (ETPH): A method of analysis designed to measure certain widely used petroleum products such as kerosene, jet and diesel fuels, and No. 2 to No. 6 fuel oil. The **ETPH** method may be used for testing soil and groundwater samples and is used specifically to demonstrate compliance with Connecticut RSRs.

Feasibility Study (FS): A report that presents the development, analysis, and comparison of remedial alternatives.

Five-Year Review: Review of any remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site. The review is conducted no less often than each five years after the initiation of the remedial action.

Groundwater: Water found beneath the earth's surface. Groundwater may transport substances that have percolated downward from the ground surface as it flows towards its point of discharge.

Hazard Index (HI): Sum of the HQs for all chemicals and all routes of exposure. Provides an indication of noncarcinogenic risks associated with the chemicals, media, and route of exposure.

Hazard Quotient (HQ): The ratio of the daily intake of a chemical from on-site exposure divided by the reference dose for that chemical. The reference dose represents the daily intake of a chemical that is not expected to cause adverse health effects.

Human Health Risk Assessment (HHRA): Scientific method to evaluate the effects on human receptors to exposure to contaminants in site-specific medium.

Inaccessible Soil: Polluted soil which is (a) more than 4 feet below the ground surface; (b) more than 2 feet below a paved surface comprised of a minimum of 3 inches of bituminous concrete or concrete, which 2 feet may include the depth of any material used as subbase for the pavement; or (c) beneath an existing building or permanent structure provided written notice has been provided to the Commissioner.

Incremental Cancer Risk (ICR): The incremental increase in the probability of developing cancer during one's lifetime from exposure to carcinogenic chemicals in addition to the background probability of developing cancer. The EPA Incremental Cancer Risk goal is between $1x10^{-6}$ (1 in a million) and $1x10^{-4}$ (1 in ten thousand) chance of cancer risk. Cancer risk less than or within the risk goal is considered an acceptable risk level by the EPA. The CTDEP Incremental Cancer Risk Guideline is $1x10^{-5}$ (1 in a hundred thousand) and applies to cumulative risk posed by multiple contaminants. The State's acceptable carcinogenic risk for individual pollutants is $1x10^{-6}$ (1 in a million).

Information Repository: A file containing information, technical reports, and reference documents regarding a Superfund site that is made available to the public.

Installation Restoration (IR) Program: The purpose of the program is to identify, investigate, assess, characterize, and clean up or control releases of hazardous substances, and to reduce the risk to human health and the environment from past waste disposal operations and hazardous material spills at Navy activities in a cost-effective manner.

milligram per kilogram (mg/kg): One part of contaminant in a million parts of a solid material.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300: Federal regulations that provide the organizational structure and procedures for preparing for and responding to discharges of oil and release of hazardous substances, pollutants, or contaminants.

National Priorities List (NPL): The EPA list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response. The list is based on the score a site receives in the Hazard Ranking System. EPA is required to update the NPL at least once a year.

New Source Area (NSA): The newly identified disposal area within Site 3 where petroleum contaminant was discovered.

Organic Compounds: Naturally occurring or man-made chemicals containing carbon. Volatile organics can evaporate more quickly than semivolatile organics. Other organics associated with RI/FS activities include pesticides and polychlorinated biphenyls (PCBs). Some organic compounds may cause cancer; however, their strength as cancer-causing agents can vary widely. Other organics may not cause cancer but may be toxic. The concentrations that can cause harmful effects can also vary widely.

Operable Unit (OU): Operable units are site management tools that define discrete steps towards comprehensive actions as part of a Superfund site cleanup. They can be based on geological portions of a site, specific site problems, initial phases of action, or any set of actions performed over time or concurrently at different parts of the site.

Polynuclear Aromatic Hydrocarbons (PAHs): High molecular weight, relatively immobile, and moderately toxic solid organic chemicals featuring multiple benzenic (aromatic) rings in their chemical formula. Typical examples of PAHs are naphthalene and phenanthrene.

Proposed Plan: A public participation requirement of SARA in which the lead agency summarizes for the public the preferred cleanup strategy and rationale for preference and reviews the alternatives presented in the detailed analysis of the FS. The Proposed Plan may be prepared either as a fact sheet or as a separate document. In either case, it must actively solicit public review and comment on all alternatives under consideration.

Remedial Investigation (RI): A report which describes the site, documents the nature and extent of contaminants detected at the site, and presents the results of the risk assessment.

Remedial Action (RA): The actual construction or implementation phase that follows the remedial design for the selected clean-up alternative at a site. Activities to control exposure to, treat, or remove contaminated media, waste, or material.

Response Action: As defined by CERCLA Section 101(25), means remove, removal, remedy, or remedial action, including enforcement activities.

Remedial Goal (RG): Allowable concentration of contaminant that can be left in medium and not adversely impact human health or the environment. It may also be the end result of a long-term action that stops or substantially reduces a release or threatened release of hazardous substances.

Responsiveness Summary: A summary of written and oral comments received during the public comment period, together with the Navy's responses to these comments.

Risk Assessment: Evaluation and estimation of the current and future potential for adverse human health or environmental effects from exposure to contaminants.

Sediment: Soil, sand, and minerals typically transported by erosion from soil to the bottom of surface water bodies, such as streams, rivers, ponds, and lakes.

Source: Area(s) of a site where contamination originates.

Superfund: The trust fund established by CERCLA that can be drawn upon to plan and conduct cleanups of past hazardous waste disposal sites and current releases or threats of releases of non-petroleum products. Superfund is often divided into removal, remedial, and enforcement components.

Superfund Amendments and Reauthorization Act (SARA): Public Law 99-499 enacted on October 17, 1986, to reauthorize the funding provisions and amend the authorities and requirements of CERCLA and associated laws. Section 120 of SARA requires that all federal facilities be subject to and comply with this act in the same manner and to the same extent as any non-government entity.

Subsurface Soil: Soil, sand, and minerals typically found deeper than the top 12 inches of the earth's surface.

Surface Soil: Soil, sand, and minerals typically found within the top 12 inches of the earth's surface.

Total Petroleum Hydrocarbons: Measure of the concentration or mass of organic compounds containing carbon and hydrogen in petroleum and derived products.

1.0 DECLARATION

1.1 SITE NAME AND LOCATION

Site 3 - New Source Area (NSA) Soil
Naval Submarine Base - New London (NSB-NLON)
Groton, Connecticut
CERCLIS ID No. CTD 980906515

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the Selected Remedy for the soil at Site 3 - NSA, a small portion of Site 3, at NSB-NLON in Groton, Connecticut. The only chemical of concern (COC) identified in the soil at Site 3 - NSA is petroleum. Petroleum is excluded from consideration under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §9601, et seq., the law more commonly known as Superfund. Therefore, the Navy recommends No Further Action (NFA) for the Site 3 - NSA soil under CERCLA.

The United States Environmental Protection Agency (EPA) and Connecticut Department of Environmental Protection (CTDEP) concur with the NFA remedy for the Site 3 - NSA soil under CERCLA.

1.3 DESCRIPTION OF SELECTED REMEDY

Site 3 - NSA, a small area within Site 3, is one of the 25 sites at NSB-NLON currently included in the Navy's Installation Restoration (IR) Program. The operable unit (OU) for Site 3 soil and sediment (OU3) was previously addressed in the OU3 Record of Decision (ROD), and the Site 3 - NSA was discovered, but not remediated, during the remedial action (RA) for OU3. Site 3 - NSA is a small abandoned disposal area (approximately 0.06 acre) located inside the northern edge of Site 3. Because the petroleum contamination found at Site 3 - NSA is not regulated under CERCLA, the Navy recommends NFA for it under CERCLA. Groundwater issues at Site 3 that are CERCLA-related will be addressed in a separate ROD.

In addition, the Navy shall address the petroleum-contaminated soil identified at Site 3 - NSA under the applicable regulations. The Navy's plan for addressing the petroleum-contaminated soil is provided in Appendix B.

1.4 STATUTORY DETERMINATIONS

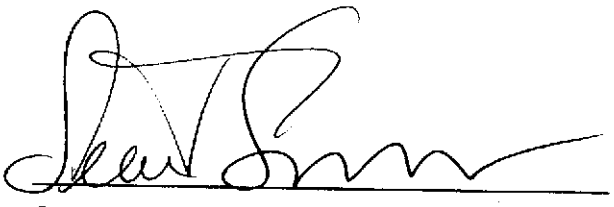
The NFA Remedy is protective of human health and the environment and complies with regulatory requirements that are applicable or relevant and appropriate.

Because there are no CERCLA-related hazardous substances, pollutants, or contaminants in the soil at the site that pose an unacceptable risk from its future use, five-year reviews will not be required for the Site 3 - NSA soil.

1.5 AUTHORIZING SIGNATURES

The signatures provided on the following pages validate the selection of the NFA remedy for the soil at Site 3 - NSA (OU3) by the Navy and EPA, respectively. The CTDEP concurs with the Selected Remedy.

Concur and recommend for implementation:



Capt. Sean P. Sullivan, USN
Commanding Officer
Naval Submarine Base - New London

11/2/04
Date

Concur and recommend for implementation:

Susan Studlien

Susan Studlien, Director
Office of Site Remediation and Restoration
EPA Region I

11/09/04

Date

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

NSB-NLON is located in southeastern Connecticut in the towns of Ledyard and Groton. NSB-NLON is situated on the east bank of the Thames River, approximately 6 miles north of Long Island Sound. It is bordered on the east by Connecticut Route 12, on the south by Crystal Lake Road, and on the west by the Thames River. The northern border is a low ridge that trends approximately east-southeastward from the Thames River to Baldwin Hill. A general facility location map is shown on Figure 2-1, and the locations of the IR Program sites, including Site 3, are shown on Figure 2-2. The location of Site 3 - NSA is shown on Figure 2-3.

Site 3 - NSA is a small area (0.06 acre) within Site 3, located on a hillside along the northeastern side of Stream 5 and Triton Road (Figure 2-4). Petroleum contamination was detected in the soil at the site. Site 3 - NSA includes a small disposal area with rusted drums, steel cable, and boulders.

2.2 SITE HISTORY AND ENFORCEMENT ACTIONS

2.2.1 Site History

During the RA for OU3, a NSA was discovered adjacent to Stream 5 at Site 3. Sediment that exhibited potential petroleum contamination (i.e., odor and sheen on pooled water) was encountered during excavation activities. Upon further investigation, rusted drums and steel cable intermingled with boulders and soil were evident in a small disposal area upgradient (north) of Stream 5 (see Figures 2-4 and 2-5). A sample of the contaminated sediment was collected and analyzed. Elevated levels of total petroleum hydrocarbons (TPH) were detected in the sample [1,750 milligrams per kilogram (mg/kg) by Method 418.1] indicating the presence of petroleum contamination. The NSA was not remediated at the time of the OU3 RA because the nature and extent of contamination was unknown; however, absorbent booms and hay bales were put in place during construction activities to minimize migration of the contamination downstream, and plastic sheeting was placed along the stream bank prior to backfilling to minimize further contaminant migration to Stream 5.

2.2.2 Previous Investigations

Site 3 was investigated during several phases, including the Phase I Remedial Investigation (RI) (Atlantic, 1992), Focused Feasibility Study (FFS) (Atlantic, 1994), Phase II RI (B&RE, 1997), and Basewide Groundwater Operable Unit Remedial Investigation (BGOURI) (TtNUS, 2002a). During completion of the Phase II RI, the Navy and regulators decided that the best strategy for the site was to address the source

area OUs at the site first and then address the groundwater OU. A Time-Critical Removal Action (TCRA) for the Overbank Disposal Area (OBDA), an area within Site 3, was completed in 1997 concurrent with the RA for Site 2 (Area A Landfill), an adjacent site (Navy, 1997). A Feasibility Study (FS) was completed for the soil and sediment OU for Site 3 (OU3). A remedial alternative was selected for OU3 and documented in a ROD (Navy, 1998). The remedial design was subsequently completed, and OU3 was remediated during 1999 and 2000. Approximately 18,050 tons of contaminated soil and sediment were excavated and disposed at off-site disposal facilities. Site restoration activities are still ongoing.

Groundwater at Site 3 was further investigated during the BGOURI in 2000, but the results of the investigation were inconclusive and data gaps remained. To address the newly found Site 3 - NSA and the data gaps identified during the BGOURI, a Data Gap Investigation (DGI) (TtNUS, 2002b) was completed in the fall of 2002 prior to initiating an FS. During the DGI, temporary wells were installed at Site 3 - NSA to measure groundwater levels and sample groundwater, and soil samples were also collected. The samples were analyzed for contaminants, including metals, organics, pesticides, and polychlorinated biphenyls (PCBs). The results of the DGI were presented and evaluated in the BGOURI Update/FS (TtNUS, 2004), and remedial alternatives were developed to address the petroleum-contaminated soil associated with Site 3 - NSA. The details of the sampling and analytical program are also discussed in Section 2.5.2 of this ROD. The results of the investigation are summarized in the following sections.

2.2.3 Enforcement Activities

On August 30, 1990, NSB-NLON was placed on the National Priorities List (NPL) by the EPA pursuant to CERCLA of 1980 and Superfund Amendments and Reauthorization Act (SARA) of 1986. The NPL is a list of uncontrolled or abandoned hazardous waste sites identified by EPA as requiring priority remedial actions.

In October and November 1994, the United States Department of the Navy (Navy), EPA, and the State of Connecticut signed the Federal Facility Agreement (FFA) (EPA, 1995) for NSB-NLON. The agreement is used to ensure that environmental impacts associated with past and present activities at NSB-NLON are thoroughly investigated and that the appropriate remedial action is pursued to protect human health and the environment. In addition, the FFA establishes a procedural framework and timetable for developing, implementing, and monitoring appropriate responses at NSB-NLON, in accordance with CERCLA (and SARA amendment of 1986, Public Law 99-499), 42 U.S.C. §9620(e)(1); the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), 40 CFR 300; Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §6901 et seq., as amended by the Hazardous and Solid Waste Amendment (HSWA) of 1984, Executive Order 12580; and applicable State laws.

2.3 COMMUNITY PARTICIPATION

The Navy has been conducting community relations activities for the IR Program since the program began. From 1988 to November 1994, Technical Review Committee (TRC) meetings were held on a regular basis. In 1994 a Restoration Advisory Board (RAB) was established to increase public participation in the IR Program process.

Many community relations activities for NSB-NLON involve the RAB. The RAB generally meets quarterly. The RAB provides a forum for discussion and exchange of information on environmental restoration activities between the Navy, regulatory agencies, and the community, and it provides an opportunity for individual community members to review the progress and participate in the decision-making process for various IR Program sites, including Site 3 - NSA.

The following community relations activities are conducted as part of the Community Relations Plan:

- **Information Repositories.** The Public Libraries in Groton and Ledyard are the designated information repositories for the NSB-NLON IR Program. All pertinent reports, fact sheets, and other documents are available at these repositories.

- **Key Contact Persons.** The Navy has designated information contacts related to the NSB-NLON. Materials distributed to the public, including any fact sheets and press releases, will indicate these contacts. The Public Affairs Officer will maintain the site mailing list to ensure that all interested individuals receive pertinent information on the cleanup.

- **Mailing List.** To ensure that information materials reach the individuals who are interested in or affected by the cleanup activities at the NSB-NLON, the Navy maintains and regularly updates the site mailing list.

- **Regular Contact with Local Officials.** The Navy arranges regular meetings to discuss the status of the IR Program with the RAB.

- **Press Releases and Public Notices.** The Navy issues press releases as needed to local media sources to announce: public meetings and comment periods; the availability of reports, and to provide general information updates.

- **Public Meetings.** The Navy conducts informal public meetings to keep residents and town officials informed about cleanup activities at the NSB-NLON, and at significant milestones in the IR Program.

Meetings are conducted to explain the findings of the RI; to explain the findings of the FS; and to present the Proposed Plan, which explains the preferred alternatives for cleaning up individual sites.

- **Fact Sheets and Information Updates.** The Navy develops a series of fact sheets to mail to public officials and other interested individuals and/or to use at handouts at the public meetings. Each fact sheet includes a schedule of upcoming meetings and other site activities. Fact sheets are used to explain certain actions or studies, to update readers on revised or new health risks, or to provide general information on the IR Program process.

- **Responsiveness Summary.** The Responsiveness Summary for the Proposed Plan (Navy, 2004) summarizes public concerns and issues raised during the public comment period and documents the Navy's formal responses. The Responsiveness Summary may also summarize community issues raised during the course of the FS.

- **Announcement of the Decision Document.** The Navy announces the signing of the Decision Document through a notice in actions or studies, to update readers on revised or new health risks, or to a major local newspaper of general circulation and a press release sent to everyone on the mailing list. The Navy places the signed Decision Document in the information repositories before any remedial actions begin.

- **Public Comment Periods.** Public comment periods allow the public an opportunity to submit oral and written comments on the proposed cleanup options. Citizens have at least 30 days to comment on the Navy's preferred alternatives for cleanup actions as indicated in the Proposed Plan.

- **Technical Assistance Grant (TAG).** A TAG from the EPA can provide up to $50,000 to a community group to hire technical advisors to assist them in interpreting and commenting on site reports and proposed cleanup actions. Currently, no TAG funds have been awarded.

- **Site Tours.** The Office of Public Affairs periodically conducts site tours for media representatives, local officials and others.

A notice of availability of the Proposed Plan (Navy, 2004a) for the Site 3 - NSA Soil was published on July 16, 2004 in The New London Day newspaper. The documents are available to the public in the NSB-NLON Information Repository located at the Groton Public Library in Groton, Connecticut and the Bill Library in Ledyard, Connecticut. The notice also announced the start of the 30-day comment period, which ended on August 17, 2004.

The notice invited the public to attend a public meeting held at the Best Western Olympic Inn in Groton, Connecticut on July 28, 2004 (Appendix A). The public meeting presented the proposed remedy and solicited oral and written comments. At the public meeting, personnel from the Navy and the CTDEP answered questions from the attendees during the informal portion of the meeting. In addition, public comments on the Proposed Plan were formally received and transcribed. The concurrence letter from the State of Connecticut is provided in Appendix B. The transcript for the public comments is provided in Appendix C. Responses to the comments received during the public comment period are provided in the Responsiveness Summary in Section 3.0.

2.4 SCOPE AND ROLE OF RESPONSE ACTION

Site 3 is one of the current 25 IR Program sites at NSB-NLON. As with many IR sites, the problems at Site 3 are complex. As a result, the work has been separated into three separate OUs:

OU3	Included the contaminated soil and sediment at Site 3
Site 3 - NSA Soil	Includes the contaminated soil at Site 3 - NSA.
OU9	Includes the Basewide Groundwater associated with the upper-base portions of NSB-NLON, including the groundwater at Sites 2, 3, 7, 9, 14, 15, 18, 20, and 23.

OU3 was remediated during 1999 and 2000. Approximately 18,050 tons of contaminated soil and sediment were excavated and disposed at off-site disposal facilities. Site 3 - NSA (0.06 acre) and the Area A Downstream Watercourses/OBDA (9 acres) are the only portions of Site 3 (approximately 75 acres) where soil issues were identified. Groundwater issues at Site 3 are being addressed separately under the ROD prepared for the Sites 3, 7, 14, 15, 18, and 20 groundwater portion of OU 9 (Basewide Groundwater) (Navy, 2004b). Therefore, this ROD only applies to Site 3 - NSA soil. Because the petroleum contamination detected in the soil at Site 3 - NSA is excluded from action under CERCLA, NFA is recommended for the site under this act. However, because the petroleum contamination does represent a potential threat to human health and the environment, the Navy shall address the petroleum-contaminated soil under the applicable regulations. The Navy's plan to address the contaminated soil at Site 3 - NSA is provided in Appendix B.

2.5 SITE CHARACTERISTICS

The location of the Site 3 - NSA, as well as the general configuration of the Area A Downstream Watercourses and adjacent areas, is shown on Figure 2-3. The location of Site 3 relative to other sites at NSB-NLON is shown on Figure 2-2. Site 3 is located in the northern portion of NSB-NLON and includes undeveloped wooded areas and recreation areas (golf course and lake for swimming).

Site 3 - NSA surface water flows into Stream 5. Stream 5 flows westward along Triton Road through the Small Arms Range and under Shark Boulevard and eventually discharges to the Thames River at the Defense Reutilization and Marketing Office (DRMO) outfall.

During the Stream 5 remediation in 1999 and DGI in 2002, environmentally significant levels of TPH were observed in the soil at the Site 3 - NSA and at the water table just northeast of Triton Road. The extent of the petroleum-contaminated soil likely extends from the NSA southwestward to underneath Triton Road (Figure 2-5).

Most of Site 3 is within designated Explosive Safety Quantity Distance (ESQD) arcs of Site 20, the Area A Weapons Center (Figure 2-2); therefore, further development is not planned for this area. Navy regulations prohibit construction of inhabited buildings or structures within these arcs and, although existing buildings operate under a waiver of these regulations, no further construction is planned.

2.5.1 Physical Setting

Site 3 is located within the lower portion of a northwest-trending valley (northern valley) situated between the topographic/bedrock high that occupies the central area of the NSB-NLON and the topographic/bedrock high that forms the northern border of the NSB-NLON. Figure 2-3 shows the surface features of Site 3.

The geology of Site 3 - NSA consists of overburden deposits overlying metamorphic bedrock. The depth to bedrock, which has been identified as the Mamacoke Formation, is 6 feet at 3TW27. The overburden southwest of Stream 5 consists of silty sandy gravel and is mapped as stratified drift of former meltwater streams (USGS, 1960). Overburden deposits northeast of Stream 5 at the NSA consist of silty sand with rock fragments and boulders (Figure 2-6).

Groundwater is present in both the overburden and bedrock underlying Site 3 - NSA. The saturated thickness of the overburden is approximately 2 feet in 3TW27. Depth to groundwater ranges from minimal to a few feet near Stream 5, increasing to the northeast. From the downstream area, groundwater flows to the west toward and discharges into the Thames River.

2.5.2 Site Investigation and Sampling

A DGI was conducted at Site 3 in the fall of 2002 to investigate the NSA and confirm the groundwater results of the BGOURI. Soil and groundwater samples were collected from Site 3 during the DGI and analyzed to further define the nature and extent of contamination at the site. The soil sampling program and a portion of the groundwater sampling program were concentrated on determining the overall nature

and extent of contamination at the NSA at Site 3. Petroleum contamination was expected in this area based on information collected during the remediation of Stream 5 sediment.

During the DGI, six surface and four subsurface soil samples were collected and analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, and PCBs, and Target Analyte List (TAL) inorganics. Extensive subsurface soil sampling efforts were not able to be performed in the suspected source area due to the presence of boulders and shallow bedrock. Subsurface sampling efforts were conducted in areas immediately downgradient of the source area where contaminants would likely migrate.

2.5.3 Nature and Extent of Contamination

Soil samples were collected from Site 3 - NSA during the DGI and analyzed to further define the nature and extent of contamination at the site. The positive soil analytical results from the DGI are summarized in Tables 2-1 and 2-2 and discussed below.

Soil

During the RA for OU3, TPH was detected at a concentration of 1,750 mg/kg in a sediment sample collected in Stream 5 at Site 3. During the DGI, stained subsurface soil and a petroleum odor were observed in this area, and vapor measurements indicated the presence of petroleum. This information confirms that there is petroleum contamination in the soil. It is likely that TPH concentrations in the soil would be similar to or higher than those found in the sediment sample. TPH concentrations of 1,750 mg/kg or greater would exceed the CTDEP residential RSR of 500 mg/kg indicating the potential for adverse health effects. This concentration also exceeds the CTDEP GA mobility criterion of 500 mg/kg indicating that there is a potential for petroleum to migrate from soil to groundwater in this area.

During the DGI, soil samples were collected from soil borings (SB) advanced during the installation of temporary wells (TWs). Six surface (3SB01, 3SB02, 3SB03, 3TW27, 3TW28, and 3TW29), and four subsurface (3SB03, 3TW27, 3TW28, and 3TW29) soil samples (Figure 2-4) were collected and analyzed for TCL VOCs, SVOCs, pesticides, and PCBs, and TAL inorganics. Extensive subsurface soil sampling efforts were not able to be performed in the suspected source area due to the presence of boulders and shallow bedrock. Subsurface sampling efforts were conducted in areas immediately downgradient of the source area where contaminants would likely migrate.

Four VOCs were infrequently detected at low concentrations in the Site 3 - NSA soil samples. Acetone was detected in 2 of 10 samples at concentrations of 90 J micrograms per kilogram (µg/kg) and 130 J µg/kg; results for the remaining eight samples were rejected. Acetone is a common laboratory

contaminant and based on the number of rejected sample results, it likely that the detected concentrations are laboratory-related versus site-related. 1,2-Dichloroethene (cis/total) was only detected in the subsurface soil sample (2 to 3 feet) from the 3SB03 boring location. Toluene and trichloroethene (TCE) were both detected at maximum concentrations (3 µg/kg and 6 µg/kg, respectively) in the subsurface soil sample (5.7 to 6.7 feet) collected from the boring for 3TW28. The release mechanism for the VOCs is not clear; however, VOCs were detected in subsurface samples, suggesting that groundwater contamination, which has been historically detected in the vicinity, may be the source of the soil contamination.

Twenty SVOCs, mainly polynuclear aromatic hydrocarbons (PAHs), were detected in the soil samples collected at the Site 3 - NSA. All of the maximum concentrations, with the exception of bis(2-ethylhexyl)phthalate (3SB03), were detected in the surface soil sample (0 to 1 foot) collected from the boring for 3TW29. A few PAHs were also detected at lower concentrations in the surface soil samples from the borings for 3TW27 and 3TW28. Field personnel reported the presence of stained soil with a strong petroleum odor and measurable photoionization detector (a portable air monitoring device which detects organic vapors) readings at the bottom of the borings for 3TW27 and 3TW28; however, elevated concentrations of TCL SVOCs/PAHs were not detected in the subsurface soil samples from these locations. Further review of the laboratory information (chromatographs) for the samples revealed that a significant number of unknown petroleum hydrocarbons were detected in the samples. The interference of these compounds on the analysis for TCL SVOCs/PAHs is reflected in the elevated detection limits reported for samples from 3SB03 and 3TW28.

Wells 3TW27, 3TW28, and 3TW29 were located downgradient of Site 3 - NSA and on the opposite (southern) side of Stream 5. PAHs were primarily detected in the surface soil samples versus subsurface soil samples from these locations, indicating that the asphalt of Triton Road or a source other than the NSA at Site 3 is the source of the contamination. The unknown petroleum hydrocarbons detected at depth in 3TW27 and 3TW28 are most likely the result of a petroleum product being spilled (leaking drum) or dumped in the Site 3 - NSA and migrating to a topographic low in the bedrock. Although no soil samples were collected for analysis from the boring for 3TW30, which is located on the southern side of Triton Road, visual inspection and field screening instruments did not indicate any contamination. Review of the boring log for 2DMW29S, which was installed in 1993 during the Phase II RI and is located west and downstream of 3TW27, did not reveal any potential contamination (stained soil). Therefore, the petroleum hydrocarbon contamination appears to be localized.

Pesticides detected in the soil samples included 1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane (DDT) and its metabolites [1,1-dichloro-2,2-bis(4-chlorophenyl)ethane (DDD) and 1,1-dichloro-2,2-bis(4-chlorophenyl)ethene (DDE)], alpha-1,2,3,4,5,6-hexachlorocyclohexane (BHC), alpha- and gamma-

chlordane, and methoxychlor. DDT and its metabolites were detected in almost every sample (minimum frequency of detection was 9 of 10 samples). Maximum concentrations of DDT and its metabolites (DDT = 1,700 µg/kg, DDD = 210 µg/kg, and DDE = 770 µg/kg) were detected in the surface soil sample from 3TW27. The soil remedial goal for the sum of DDT and it metabolites (DDTR) during the recent RA was 5.0 mg/kg. Therefore, the maximum DDTR concentration in soil (2.7 mg/kg in surface soil from 3TW27) does not exceed the soil remedial goal for DDTR. The remaining pesticides were detected infrequently (less than 2 of 10 samples) and at much lower concentrations.

Aroclor-1260 was detected in 2 of 10 samples at low concentrations (less than 70 µg/kg). The two detections of the PCB were found in the surface and subsurface soil samples collected from 3SB03.

Twenty-one inorganics were detected in the soil samples. Fourteen of the inorganics were detected in almost every sample (9 of 10 samples or more), and 18 were detected at maximum concentrations that exceeded background concentrations. Calcium, lead, manganese, mercury, sodium, vanadium, and zinc were detected frequently, and the maximum detected concentrations of these inorganics were typically greater than one order of magnitude higher than background concentrations. All of the maximum concentrations of inorganics were found in the surface soil sample from 3SB03 and the subsurface soil samples from 3TW27 and 3TW28.

2.6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

This section of the ROD discusses the current and reasonable anticipated future land uses and current and potential beneficial groundwater uses at Site 3 - NSA. This section forms the basis of reasonable exposure assessment assumptions and risk characterization conclusions.

Site 3 - NSA is located along Triton Road between the Small Arms Range and Site 7 - Torpedo Shops. Reasonable potential future land use of the area includes the continued use as an undeveloped area. There are no plans for residential development of the site. The groundwater aquifers found within the overburden and within the bedrock are not used as drinking water sources or for industrial water supply purposes. The groundwater is classified as GB by the State of Connecticut. The overburden groundwater discharges to a stream (Stream 5) that eventually discharges to the Thames River and is hydraulically connected to the bedrock aquifer. There are no plans to use either the overburden or bedrock aquifers in this area for drinking water or industrial water supply purposes.

It is unlikely that the site will be developed for residential use. However, hypothetical future residential use of the site was evaluated in the risk assessment for the purposes of completeness and to determine whether land use controls are needed.

Most of Site 3 is within designated ESQD arcs of the Area A Weapons Center; therefore, further development is not planned for this area. Navy regulations prohibit construction of inhabited buildings or structures within these arcs and, although existing buildings operate under a waiver of these regulations, no further construction is planned.

2.7 SITE RISKS

The purpose of a risk assessment is to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminated media at a site. The results of the risk assessment provide the basis for taking action and identify the contaminants and exposure pathways that need to be addressed by the response action.

The human health and ecological risks associated with exposure to soil at Site 3 - NSA were evaluated in the BGOURI Update/FS (TtNUS, 2004). The results of these risk assessments are provided below.

2.7.1 Summary of Human Health Risk Assessment

The major components of a human health risk assessment (HHRA) include data evaluation, exposure assessment, toxicity assessment, risk characterization, and uncertainty analysis. Data evaluation is a task that uses a variety of information to determine which of the chemicals detected in site media are most likely to present a risk to potential receptors. The end result of the evaluation is a list of Contaminants of Potential Concern (COPCs) and representative exposure point concentrations for each medium. During the exposure assessment, potential human exposure pathways are identified at the source areas under consideration. Chemical-specific toxicity criteria for the identified COPCs are identified during the toxicity assessment and are used in the quantification of potential human health risks. Risk characterization involves quantifying the risks associated with exposure to the COPCs using algorithms established by the EPA and CTDEP. Risks from chemicals are calculated for either carcinogenic or noncarcinogenic effects. The uncertainty analysis identifies limitations in the risk assessment that might affect the final risk results. The final result of the risk assessment is the identification of medium-specific COCs and exposure pathways that need to be addressed by a RA.

COPCs were identified by comparing maximum concentrations of contaminants to risk-based and health-based criteria. Soil concentrations were compared to EPA Region 9 Preliminary Remediation Goals (PRGs) for residential exposure to soil (EPA, 2002), CTDEP RSRs for residential exposure to soil and CTDEP pollutant mobility criteria for migration from soil to groundwater (CTDEP, 1996), and EPA Soil Screening Levels (SSLs) for soil to air and for migration from soil to groundwater (EPA, 1996). If the maximum concentration exceeded any criterion, the chemical was retained for all exposure routes involving the associated medium. The Site 3 - NSA soil COPCs (surface and subsurface) and the

screening criteria used to identify them are summarized in Tables 2-1 and 2-2. The tables differentiate COPCs based on direct contact and migration exposure scenarios.

Potential receptors for exposures to soil at the Site 3 - NSA included construction workers, full-time employees, adolescent trespassers, and hypothetical child and adult residents. Potential exposure pathways evaluated for exposures to soil included incidental ingestion and dermal contact. The construction worker and hypothetical child and adult residents were assumed to be exposed to surface and subsurface soil. Adolescent trespassers and full-time employees were assumed to be exposed only to surface soil. Potential receptors for exposures to groundwater at Site 3 included construction workers and future adult residents. Dermal contact with groundwater was evaluated as a potential route of exposure for the construction worker. Exposures to groundwater through direct ingestion, dermal contact while showering/bathing, and inhalation of volatiles while showering/bathing were evaluated for hypothetical adult residents.

Exposure point concentrations for each of the COPCs were developed for reasonable maximum exposure (RME) and central tendency exposure (CTE) scenarios. Based on the limited data set, the maximum and average concentrations were used for surface soil exposure concentrations under the RME and CTE scenarios, respectively. The 95 percent Upper Confidence Limit was used as the exposure concentration for exposures to subsurface soil under the RME and CTE scenarios.

Potential human health risks resulting from exposure to Site 3 - NSA COPCs were estimated using algorithms established by the EPA and CTDEP. The algorithms are used to calculate risk as a function of chemical concentration, human exposure parameters, and toxicity. Risks attributable to exposure to chemical carcinogens were estimated as the probability of an individual developing cancer over a lifetime [incremental cancer risk (ICR)]. According to EPA, risks less than 1×10^{-6} (or a risk less than one in one million) are generally considered to be "acceptable," and risks greater than 1×10^{-4} (1 in 10,000) are generally considered to be "unacceptable." According to CTDEP, risks less than 1×10^{-5} (1 in 100,000) for cumulative risk or 1×10^{-6} (1 in 1,000,000) for individual chemicals are generally considered to be "acceptable," while risks greater than 1×10^{-5} for cumulative risk or 1×10^{-6} for individual chemicals, are generally considered to be "unacceptable." The hazards associated with the effects of noncarcinogenic chemicals were evaluated by comparing an exposure level or intake to a reference dose (RfD). If the ratio of the intake of a chemical to the reference dose [hazard quotient (HQ)] exceeds unity, noncarcinogenic (toxic) effects may occur. A hazard index (HI) was generated by summing the individual HQs for all the COPCs associated with a specific pathway. If the value of the HI exceeds unity, noncarcinogenic health effects associated with that particular chemical mixture may occur, and therefore it is necessary to segregate the HQs by target organ effects or mechanism of action. The HQ should not

be construed as a probability in the manner of the ICR, but rather as a numerical indicator of the extent to which a predicted intake exceeds or is less than a reference dose (RfD).

Tables 2-3 and 2-4 present the cancer risks and HIs for Site 3 - NSA under the RME and CTE scenarios, respectively. Risk Assessment Guidance for Superfund (RAGS) Part D, Summary of Receptor Risks and Hazards for COPCs, tables for Site 3 - NSA are included in Appendix D. Cumulative ICRs and HIs resulting from exposure to soil at Site 3 - NSA were within the EPA and CTDEP acceptable ranges for the receptors and scenarios considered. All ICRs were less than or within EPA's target risk range of 10^{-4} to 10^{-6}, while the ICR for a hypothetical child resident was essentially equal to CTDEP's acceptable risk level of 10^{-5}. PAHs were the major contributors to the ICRs, but PAHs were later eliminated as COCs because they were found to be related to the Triton Road asphalt pavement. No HIs exceeded the acceptable level of 1.0.

The chemicals identified as a concern in Site 3 - NSA soil during the HHRA were further evaluated during the uncertainty analysis using additional information such as background levels, nature and extent information (e.g., frequency of detection), field data (water quality), and Applicable or Relevant and Appropriate Requirements (ARARs). The following table summarizes the COCs for Site 3 - NSA soil that were identified through the HHRA and uncertainty analysis.

Medium	Method	Scenario	COCs Based on Federal Requirements	COCs Based on CTDEP Requirements
Soil	HHRA	Carcinogenic	None	None
		Non-Carcinogenic	None	None
	Direct Comparison Criteria	Direct Contact - Residential	None	Petroleum (TPH)
		Migration from Soil to Groundwater	None	Petroleum (TPH)

2.7.2 Summary of Ecological Risk Assessment

2.7.2.1 Introduction

The goal of the ecological risk assessment (ERA) was to determine whether adverse ecological impacts are present as a result of exposure to chemicals released to the environment at the Site 3 - NSA. The ERA methodology was in accordance with the Final Guidelines for Ecological Risk Assessment (EPA, 1998), the Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (EPA, 1997), and Navy Policy for Conducting Ecological Risk Assessments

(Navy, 1999). The ERA consisted of Steps 1, 2, and 3a of the ERA process. A summary of the ERA conducted for the soils at Site 3 - NSA is provided below.

2.7.2.2 Exposure Assessment

A general description of Site 3 is presented in Section 2.5 of this document. Site 3 - NSA, located adjacent to Stream 5 in the northern portion of Site 3, is very small and consists primarily of a steep embankment (see Figure 2-5). The embankment slopes to an intermittent stream (Stream 5) separated from Triton Road by a narrow strip of grassed land (approximately 10 to 15 feet wide). The embankment is covered by large rocks, boulders, and small trees.

Figure 2-7 presents the ecological conceptual site model for the Site 3 - NSA. In summary, the primary source of contamination was assumed to originate at the surface. It is likely that the contamination migrated through the soil to groundwater. In addition, contamination that migrated to groundwater could have discharged to Stream 5. There is also a possibility that contamination could have migrated to Stream 5 sediment as a result of erosion of the embankment. Ecological receptors can be exposed to contaminants in the surface water, sediment, and surface soil by direct exposure, ingestion of media, and ingestion of contaminated food items. Significant exposure of terrestrial wildlife to chemicals in the soil at Site 3 - NSA, however, is unlikely because the site is small and a poor ecological habitat.

2.7.2.3 Assessment and Measurement Endpoints

For the ERA, the assessment endpoints included the protection of the following groups of receptors from a reduction in growth, survival, and/or reproduction caused by site-related chemicals:

- Soil invertebrates.
- Benthic invertebrates
- Aquatic invertebrates
- Terrestrial vegetation

The following measurement endpoints were used to evaluate the assessment endpoints in this ERA:

- Decreases in survival, growth, and/or reproduction of plants and soil invertebrates were evaluated by comparing the measured concentrations of chemicals in the surface soil to surface soil screening values designed to be protective of these ecological receptors.

- Decreases in survival, growth, and/or reproduction of benthic invertebrates were evaluated by comparing the measured concentrations of chemicals in the surface soil to sediment screening values

designed to be protective of these ecological receptors. Sediment samples were not collected to determine potential risks to benthic and aquatic invertebrates because Stream 5 was recently remediated. Surface soil samples were compared to sediment screening values as a conservative measure to evaluate the potential migration pathway of soil erosion into the stream.

2.7.2.4 Identification of Chemicals of Potential Concern

Potential risks to terrestrial plants, invertebrates and aquatic receptors resulting from exposure to chemicals were evaluated by comparing the chemical concentrations in the surface soil to surface soil and sediment (to evaluate soil after it is transported to the stream) screening levels. Tables 2-5 and 2-6 present the sources of the screening levels. An ecological effects quotient (EEQ) approach was used to characterize the risk to potential ecological receptors. This approach characterizes the potential effects by comparing exposure concentrations with effects data. The EEQs for terrestrial and aquatic receptors were calculated as follows:

$$EEQ = \frac{C_{ss}}{SSSL} \text{ or } EEQ = \frac{C_{ss}}{SdSL}$$

where:

EEQ = Ecological effects quotient (unitless)
C_{ss} = Contaminant concentration in surface soil (µg/kg or mg/kg)
SSSL = Plant or invertebrate surface soil screening level (µg/kg or mg/kg)
SdSL = Aquatic receptor sediment screening level (µg/kg or mg/kg)

Ecological COPCs were selected by the following procedures:

- Chemicals with EEQs greater than 1.0 (using maximum concentrations) were retained as COPCs for further evaluation because they have a potential to cause risk to ecological receptors.

- Contaminants without screening levels were retained as COPCs but were only evaluated qualitatively.

All detected SVOCs, two pesticides, one PCB, and 10 metals were retained as COPCs in surface soil (Table 2-7). All chemicals were retained as COPCs because their maximum detected concentrations exceeded associated surface soil screening value (SSSVs), excluding carbazole, dibenzofuran, and iron. These chemicals were retained as COPCs because no SSSVs were available for comparison.

All detected SVOCs, five pesticides, one PCB, and eight metals were retained as COPCs in surface soil to conservatively assess the potential future migration of soil contaminants to Stream 5 sediments (Table 2-8). Of these, PAHs were retained because their maximum detected concentrations exceeded the associated total PAH sediment screening value (SdSV). Alpha-chlordane, gamma-chlordane, Aroclor-1260, barium, cadmium, copper, lead, mercury, silver, vanadium, and zinc were retained as COPCs because their maximum detected concentrations exceeded associated SdSVs. Carbazole, bis(2-ethylhexyl)phthalate, and dibenzofuran were retained as COPCs because no toxicity information was available for comparison.

2.7.2.5 Step 3A – Refinement of Conservative Exposure Assumptions

Step 3a consists of a refinement of the conservative exposure assumptions used to select COPCs to more realistically estimate potential risks to ecological receptors. This refinement is qualitative in nature and discusses items such as habitat, exposure concentrations, and alternate benchmarks.

Although potential risks to soil invertebrates and terrestrial vegetation exist, as indicated by the conservative screening, the likelihood of exposure to these receptors is small. The steep embankment is covered by patches of soil, large rocks and boulders, and small trees. Due to the rocky substrate and patches of soil, understory shrubbery does not exist. Because trees are present along the embankment, it is assumed that potential contamination at Site 3 - NSA is not adversely affecting vegetation. Additionally, the lack of understory inhibits the Site 3 - NSA as a potential foraging and nesting area for small mammals and birds. There are, however, areas surrounding Site 3 - NSA that provide much better habitat and so small mammals and birds in the area would most likely be drawn to other areas for their necessary resources. Therefore, based on the lack of beneficial habitat for these species, it is assumed that the greatest risk posed to ecological receptors is from the potential migration pathway of soil erosion to sediment and not from direct exposure of contamination in the surface soil.

The chemicals discussed in the following paragraphs were retained as COPCs because their maximum detections in surface soil exceeded SdSVs or because SdSVs were not available for comparison. Average concentrations were compared to the benchmarks (see Table 2-8) during the refinement process because soil erosion into the stream would occur over an average area, and the soil would mix as it enters the stream. Therefore, it is more likely that benthic invertebrates in the stream would be exposed to the average soil concentration after the soil migrates to Stream 5 sediments.

In the Step 3a refinement, total PAH concentrations were evaluated in place of individually detected PAH concentrations because the toxicity of PAHs may be additive. The average total PAH concentration of 4,185 µg/kg exceeded the SdSV, but the average concentration (986 µg/kg) was well below the SdSV

after excluding sample S3SS3TW2901. The sample location with the maximum total PAH concentration, S3SS3TW2901, was located within the narrow strip of grass separating Stream 5 and Triton Road. Detections of PAHs in this sample location are potentially attributable to asphalt, road traffic, or waste oil from Triton Road. Because the strip is vegetated, the possibility for soil erosion to Stream 5 from this sample is low. Therefore, PAHs were not expected to cause a risk to aquatic receptors, and PAHs were not retained as COCs.

In the duplicate of soil sample S3SS3SB0301, bis(2-ethylhexyl)phthalate was detected at a maximum concentration of 1,200 µg/kg, and was detected in five of six samples collected at an average of 337 µg/kg. Both the maximum and average detected concentrations are less than the alternate benchmark of 1,300 µg/kg (Buchman, 1999). Therefore, potential risks to aquatic receptors from current soil concentrations were considered unlikely, and bis(2-ethylhexyl)phthalate was not retained as a COC.

Carbazole and dibenzofuran were each detected in only one of six soil samples collected at a concentrations of 140 µg/kg and 52 µg/kg, respectively, in sample S3SS3TW2901. The average carbazole concentration was higher (321 µg/kg) due to elevated detection limits in some samples. However, both the maximum and average detected concentrations were less than the alternate benchmark of 1,800 µg/kg (Cubbage, et al., 1997). The maximum (52 µg/kg) and average (306 µg/kg due to elevated detection limits) dibenzofuran concentrations were less than the alternate benchmark of 5,100 µg/kg (Buchman, 1999). The sample containing the detected concentrations of carbazole and dibenzofuran was located within the narrow strip of grass separating Stream 5 and Triton Road. Because the strip is vegetated, the possibility of soil erosion to Stream 5 from this location is low. Due to the low frequency of detection and low concentrations compared to the alternate benchmarks, potential risks to aquatic receptors from carbazole and dibenzofuran in the surface soil are considered unlikely. Carbazole and dibenzofuran were not retained as COCs.

DDD, DDE, and DDT were retained as COPCs because the sum DDTR concentration of 2,680 µg/kg in sample S3SS3TW2701 exceeded the sum DDTR SdSV of 2,000 µg/kg. Soil sample S3SS3TW2701 was located in the narrow strip of grass dividing Triton Road from Stream 5, and it was known that DDD, DDE, and DDT were historically used at Site 3 for mosquito control. Other DDTR totals, including the average sum DDTR concentration of 705 µg/kg, are less than 2,000 µg/kg, indicating that the presence of these pesticides in surface soil would not cause risk to aquatic receptors as a result of soil erosion to Stream 5. For this reason, DDD, DDE, and DDT were not retained as COCs.

Aroclor-1260 was retained as a COPC because the maximum detection in the duplicate of surface soil sample S3SS3SB0301 exceeded the SdSV. However, Aroclor-1260 was only detected at this sample location, and the original sample result (S3SS3SB0301) of 55 µg/kg does not exceed the SdSV.

Additionally, the average of all results, 18.7 µg/kg, is well below the SdSV and the consensus-based Probable Effects Concentration (PEC) of 676 µg/kg. Therefore, due to the low frequency of detection and low concentrations, potential risks to aquatic receptors from Aroclor-1260 in the surface soil are unlikely. Aroclor-1260 is not retained as a COC.

The pesticides alpha- and gamma-chlordane were retained as COPCs because they were detected at concentrations exceeding their associated SdSVs. These pesticides were both detected in only one of six surface soil samples (S3SS3SB0301-D). However, the detected concentrations of these pesticides (12 µg/kg and 13 µg/kg, respectively) are less than the consensus-based PEC of 17.6 µg/kg (see Table 2-6). In addition, the averages of all results (12.1 µg/kg and 12.2 µg/kg, respectively), which consider detection limits for nondetect data, are also less than the PEC. Therefore, due to the low frequency of detection and low concentrations, potential risks to aquatic receptors from alpha- and gamma-chlordane in the surface soil are unlikely. Alpha-chlordane and gamma-chlordane were not retained as COCs.

Barium, cadmium, copper, lead, mercury, silver, vanadium, and zinc were retained as COPCs because their maximum detected concentrations at location S3SS3SB03 exceeded their associated SdSLs. Sample location S3SS3SB03 is located along the steep embankment (see Figure 2-4, 3SB03). Comparisons to the average barium, cadmium, copper, lead, mercury, silver, vanadium, and zinc concentrations are appropriate to realistically evaluate the potential migration pathway. In all cases, the averages of all soil results are less than associated SdSVs or consensus-based PECs. For example, the average of all soil results for barium is 47.7 mg/kg; the SdSV is 48 mg/kg. The average of all soil results for cadmium is 0.67 mg/kg; the SdSV is 0.99 mg/kg. The average of all soil results for copper is 25.7 mg/kg; the SdSV is 32 mg/kg. The average of all soil results for lead is 43.9 mg/kg; the SdSV is 36 mg/kg, but the PEC is 128 mg/kg. The average of all soil results for mercury is 0.78 mg/kg; the SdSV is 0.18 mg/kg, but the PEC is 1.06 mg/kg. The average of all soil results for silver is 0.52 mg/kg; the SdSV is 1 mg/kg. The average of all soil results for vanadium is 53.1 mg/kg; the SdSV is 57. The average of all soil results for zinc is 181 mg/kg; the SdSV is 121 mg/kg, but the PEC is 459 mg/kg. Based on the potential migration pathway and current concentrations in surface soil, these metals are not likely to cause unacceptable risks to aquatic receptors in Stream 5; therefore, these metals are not retained as COCs.

2.7.2.6 Summary and Conclusions of ERA

Several chemicals detected in surface soil were initially retained as COPCs because their chemical concentrations exceeded screening levels resulting in EEQs greater than 1.0 based on the conservative exposure scenarios. These chemicals were then re-evaluated in Step 3a of the ERA to determine which chemicals have the greatest potential for causing risks to ecological receptors and should therefore should be retained as COCs for further discussion/evaluation. The ecological endpoints evaluated in this

ERA were terrestrial invertebrates and plants and aquatic receptors. In summary, no chemicals were retained as ecological COCs in any medium.

2.7.3 Summary of Site Risks

The results of the HHRA conducted during the BGOURI Update/FS for contaminants other than TPH, such as metals and organic compounds, indicated that there were no unacceptable risks to human health or the environment at Site 3 - NSA. Considered collectively, the TPH result collected during the RA for Stream 5, the DGI field results (stained soil), and the risk assessment uncertainties evaluation indicate that petroleum detected in the subsurface soil does present a potential risk to human health and the environment. Therefore, petroleum was retained as a COC for soil. TPH has no toxicity value; therefore an exposure assessment, toxicity assessment, and risk characterization could not be performed for TPH.

In addition, a screening level ERA was conducted for Site 3 - NSA contaminants other than TPH, and it showed that there are no significant risks to ecological receptors from direct exposure to soil or potential exposure from migration of soil to sediment or groundwater to surface water at the Site 3 - NSA. Based on the HHRA, ERA, and a comparison of site data to criteria indicative of direct exposure and potential migration concerns, only petroleum was retained as a COC. A comparison to CTDEP criteria showed that there are potential unacceptable risks to future hypothetical residents from exposure to petroleum in Site 3 - NSA soil.

2.8 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for Site 3 - NSA soil at NSB-NLON, Groton, Connecticut was released for public comment in July 16, 2004. The Proposed Plan identified NFA as the Selected Remedy for Site 3 - NSA soil. The Navy reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to this decision, as originally identified in the Proposed Plan, were necessary or appropriate.

TABLE 2-1

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE/SUBSURFACE SOIL AT SITE 3 - NSA
DIRECT CONTACT EXPOSURE SCENARIOS
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil
Exposure Point: Site 3

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Nondetects[2]	Concentration Used for Screening[3]	Background Value[4]	Risk-Based COPC Screening Level[5]		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag[6]	Rationale for Contaminant Deletion or Selection
Volatile Organic Compounds																	
67-64-1	Acetone	90	J	130	J	UG/KG	S3SB3TW2801	2/2	NA	130	NA	160000	N	NA 500000	SSL-INH CTRESSOIL	NO	BSL
156-59-2	cis-1,2-Dichloroethene	1	J	1	J	UG/KG	S3SB3SB0301	1/10	5 - 7	1	NA	4300	N	NA 500000	SSL-INH CTRESSOIL	NO	BSL
108-88-3	Toluene	3	J	3	J	UG/KG	S3SB3TW2801	1/10	5 - 7	3	NA	520000	SAT	650000 500000	SSL-INH CTRESSOIL	NO	BSL
540-59-0	Total 1,2-Dichloroethene	1	J	1	J	UG/KG	S3SB3SB0301	1/10	11 - 14	1	NA	4300[13]		NA NA	SSL-INH CTRESSOIL	NO	NTX
79-01-6	Trichloroethene	2	J	6	J	UG/KG	S3SB3TW2801	2/10	2 - 7	6	NA	53	C	4600 58000	SSL-INH CTRESSOIL	NO	BSL
Semivolatile Organic Compounds																	
91-57-6	2-Methylnaphthalene	16	J	16	J	UG/KG	S3SS3TW2901	1/10	340 - 3600	16	NA	5600[7]	N	NA 474000	SSL-INH CTRESSOIL	NO	BSL
83-32-9	Acenaphthene	33	J	59	J	UG/KG	S3SS3TW2901	2/10	340 - 3600	59	NA	370000	N	NA 1000000	SSL-INH CTRESSOIL	NO	BSL
208-96-8	Acenaphthylene	25	J	310	J	UG/KG	S3SS3TW2901	4/10	340 - 3600	310	NA	370000[8]	N	NA 1000000	SSL-INH CTRESSOIL	NO	BSL
120-12-7	Anthracene	310	J	310	J	UG/KG	S3SS3TW2901	1/10	340 - 3600	310	NA	2200000	N	NA 1000000	SSL-INH CTRESSOIL	NO	BSL
56-55-3	Benzo(a)anthracene	36	J	1800		UG/KG	S3SS3TW2901	7/10	340 - 3600	1800	NA	620	C	NA 1000	SSL-INH CTRESSOIL	YES	ASL
50-32-8	Benzo(a)pyrene	48	J	2000		UG/KG	S3SS3TW2901	5/10	340 - 3600	2000	NA	62	C	NA 1000	SSL-INH CTRESSOIL	YES	ASL
205-99-2	Benzo(b)fluoranthene	74	J	2600		UG/KG	S3SS3TW2901	5/10	340 - 3600	2600	NA	620	C	NA 1000	SSL-INH CTRESSOIL	YES	ASL
191-24-2	Benzo(g,h,i)perylene	87	J	1200	J	UG/KG	S3SS3TW2901	5/10	340 - 3600	1200	NA	230000[9]	N	NA 1000000	SSL-INH CTRESSOIL	NO	BSL
207-08-9	Benzo(k)fluoranthene	35	J	1000	J	UG/KG	S3SS3TW2901	4/10	340 - 3600	1000	NA	6200	C	NA 8400	SSL-INH CTRESSOIL	NO	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	29	J	1200	J	UG/KG	S3SS3SB0301-D	9/10	450 - 3600	1200	NA	35000	C	NA 44000	SSL-INH CTRESSOIL	NO	BSL
86-74-8	Carbazole	140	J	140	J	UG/KG	S3SS3TW2901	1/10	340 - 3600	140	NA	24000	C	NA 31000	SSL-INH CTRESSOIL	NO	BSL
218-01-9	Chrysene	38	J	1800		UG/KG	S3SS3TW2901	7/10	340 - 3600	1800	NA	62000	C	NA 84000	SSL-INH CTRESSOIL	NO	BSL
53-70-3	Dibenzo(a,h)anthracene	480		480		UG/KG	S3SS3TW2901	1/10	340 - 3600	480	NA	62	C	NA 1000	SSL-INH CTRESSOIL	YES	ASL
132-64-9	Dibenzofuran	34	J	52	J	UG/KG	S3SS3TW2901	2/10	340 - 3600	52	NA	29000	N	NA 270000	SSL-INH CTRESSOIL	NO	BSL
206-44-0	Fluoranthene	48	J	2400		UG/KG	S3SS3TW2901	8/10	340 - 890	2400	NA	230000	N	NA 1000000	SSL-INH CTRESSOIL	NO	BSL
86-73-7	Fluorene	67	J	91	J	UG/KG	S3SS3TW2901	2/10	340 - 3600	91	NA	270000	N	NA 1000000	SSL-INH CTRESSOIL	NO	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	100	J	1200		UG/KG	S3SS3TW2901	5/10	340 - 3600	1200	NA	620	C	NA 1000	SSL-INH CTRESSOIL	YES	ASL
91-20-3	Naphthalene	14	J	14	J	UG/KG	S3SS3TW2901	1/10	340 - 3600	14	NA	5600	N	170000 1000000	SSL-INH CTRESSOIL	NO	BSL
85-01-8	Phenanthrene	33	J	1300		UG/KG	S3SS3TW2901	7/10	340 - 890	1300	NA	230000[9]	N	NA 1000000	SSL-INH CTRESSOIL	NO	BSL
129-00-0	Pyrene	70	J	3600		UG/KG	S3SS3TW2901	8/10	340 - 890	3600	NA	230000	N	NA 1000000	SSL-INH CTRESSOIL	NO	BSL
Pesticides/PCB																	
72-54-8	4,4'-DDD	2.9	J	210		UG/KG	S3SS3TW2701	9/10	3.4	210	NA	2400	C	NA 2600	SSL-INH CTRESSOIL	NO	BSL
72-55-9	4,4'-DDE	0.87	J	770		UG/KG	S3SS3TW2701	10/10	NA	770	NA	1700	C	NA 1800	SSL-INH CTRESSOIL	NO	BSL

TABLE 2-1

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE/SUBSURFACE SOIL AT SITE 3 - NSA
DIRECT CONTACT EXPOSURE SCENARIOS
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration [1]	Minimum Qualifier	Maximum Concentration [1]	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Nondetects[2]	Concentration Used for Screening[3]	Background Value[4]	Risk-Based COPC Screening Level[5]		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag[6]	Rationale for Contaminant Deletion or Selection
50-29-3	4,4'-DDT	1.8	J	1700		UG/KG	S3SS3TW2701	9/10	4.5	1700	NA	1700	C	750000 1800	SSL-INH CTRESSOIL	NO	BSL
319-84-6	Alpha-BHC	1.7	J	1.7	J	UG/KG	S3SS3TW2901	1/10	1.7 - 56	1.7	NA	90	C	760 97	SSL-INH CTRESSOIL	NO	BSL
5103-71-9	Alpha-Chlordane	9.8	J	12	J	UG/KG	S3SS3SB0301-D	2/10	1.8 - 56	12	NA	1600	C	20000 490	SSL-INH CTRESSOIL	NO	BSL
11096-82-5	Aroclor-1260	55		69		UG/KG	S3SS3SB0301-D	2/10	18 - 23	69	NA	220	C	1900 1000	SSL-INH CTRESSOIL	NO	BSL
5103-74-2	Gamma-Chlordane	9.3	J	13	J	UG/KG	S3SS3SB0301-D	2/10	1.8 - 56	13	NA	1600	C	NA 490	SSL-INH CTRESSOIL	NO	BSL
72-43-5	Methoxychlor	4.1	J	4.1	J	UG/KG	S3SB3TW2801	1/10	17 - 560	4.1	NA	31000	N	NA 340000	SSL-INH CTRESSOIL	NO	BSL
Total Metals																	
7429-90-5	Aluminum	2730		16000		MG/KG	S3SB3TW2801	10/10	NA	16000	17600	7800	N	NA NA	SSL-INH CTRESSOIL	NO	BKG, EPAI
7440-36-0	Antimony	0.53	J	0.53	J	MG/KG	S3SS3SB0301	1/1	NA	0.53	2.05	3.1	N	NA 27	SSL-INH CTRESSOIL	NO	BSL, BKG
7440-38-2	Arsenic	0.43	J	3.9		MG/KG	S3SB3TW2701	10/10	NA	3.9	3.6	0.39	C	746 10	SSL-INH CTRESSOIL	YES	ASL
7440-39-3	Barium	16.3		127		MG/KG	S3SB3TW2801	10/10	NA	127	57.2	540	N	686000 4700	SSL-INH CTRESSOIL	NO	BSL
7440-43-9	Cadmium	3.7		3.7		MG/KG	S3SS3SB0301	1/10	0.42 - 1.6	3.7	0.21	3.7	N	1780 34	SSL-INH CTRESSOIL	NO	BSL
7440-70-2	Calcium	254		3420	J	MG/KG	S3SB3TW2801	10/10	NA	3420	499	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7440-47-3	Chromium[11]	4.3		19.3		MG/KG	S3SB3TW2801	10/10	NA	19.3	21.5	30	C	270 100	SSL-INH CTRESSOIL	NO	BSL, BKG
7440-48-4	Cobalt	2.4		17.1		MG/KG	S3SB3TW2801	7/10	5.5 - 6.1	17.1	8	900	C	NA NA	SSL-INH CTRESSOIL	NO	BSL
7440-50-8	Copper	6.8		65.6		MG/KG	S3SS3SB0301	10/10	NA	65.6	25.5	310	N	NA 2500	SSL-INH CTRESSOIL	NO	BSL
7439-89-6	Iron	3700		27700		MG/KG	S3SB3TW2801	10/10	NA	27700	17200	2300	N	NA NA	SSL-INH CTRESSOIL	NO	EPAI
7439-92-1	Lead	1.9		192	J	MG/KG	S3SS3SB0301	10/10	NA	192	17.5	400[12]		NA 500	SSL-INH CTRESSOIL	NO	BSL
7439-95-4	Magnesium	1120		9460		MG/KG	S3SB3TW2801	10/10	NA	9460	3650	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7439-96-5	Manganese	126		573	J	MG/KG	S3SB3TW2801	10/10	NA	573	188	180	N	68600 NA	SSL-INH CTRESSOIL	YES	ASL
7439-97-6	Mercury	0.09		3	J	MG/KG	S3SS3SB0301	6/10	0.02 - 0.18	3	0.05	2.3	N	NA 20	SSL-INH CTRESSOIL	YES	ASL
7440-02-0	Nickel	11.2	J	19.4	J	MG/KG	S3SS3SB0301	3/10	3.2 - 12.6	19.4	9.95	160	N	13000 1400	SSL-INH CTRESSOIL	NO	BSL
7440-09-7	Potassium	992		6210		MG/KG	S3SB3TW2801	9/10	1150	6210	2580	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7782-49-2	Selenium	0.53	J	0.72	J	MG/KG	S3SS3SB0301	7/10	0.4 - 0.52	0.72	0.425	39	N	NA 340	SSL-INH CTRESSOIL	NO	BSL
7440-22-4	Silver	0.26	J	1.8		MG/KG	S3SS3SB0301	3/10	0.17 - 0.27	1.8	0.365	39	N	NA 340	SSL-INH CTRESSOIL	NO	BSL
7440-23-5	Sodium	56.5		193		MG/KG	S3SB3TW2801	9/10	76.4 - 87.2	193	20.56	NA		NA NA	SSL-INH CTRESSOIL	NO	NUT
7440-62-2	Vanadium	6		335	J	MG/KG	S3SS3SB0301	10/10	NA	335	35.1	55	N	NA 470	SSL-INH CTRESSOIL	YES	ASL
7440-66-6	Zinc	13.8		902		MG/KG	S3SS3SB0301-D	10/10	NA	902	31.3	2300	N	NA 20000	SSL-INH CTRESSOIL	NO	BSL
Miscellaneous																	
TTNUS046	Total Solids	74		97		%	S3SB3TW2901	10/10	NA	97	NA	NA		NA NA	SSL-INH CTRESSOIL	NO	NTX

A shaded value indicates that the concentration used for screening exceeds the criterion or background value.
A shaded chemical name indicates that the chemical has been selected as a COPC.

TABLE 2-1

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE/SUBSURFACE SOIL AT SITE 3 - NSA
DIRECT CONTACT EXPOSURE SCENARIOS
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Nondetects[2]	Concentration Used for Screening[3]	Background Value[4]	Risk-Based COPC Screening Level[5]	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag[6]	Rationale for Contaminant Deletion or Selection

Footnotes:

1 Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations.
2 Values presented are sample-specific quantitation limits.
3 The maximum detected concentration is used for screening purposes.
4 Atlantic, 1995. Background concentrations of Inorganics in Soil - Naval Submarine Base - New London. If the maximum, detected concentration of an inorganic is less than the background concentration, then that metal is not selected as a COPC.
5 The risk-based COPC screening level for residential land use is presented. The value is based on a target Hazard Quotient of 0.1 for noncarcinogens (denoted with a "N" flag) or an incremental cancer risk of 1E-6 for carcinogens (denoted with a "C" flag) (EPA, 2002). PRGs for noncarcinogens are divided by 10.
6 The chemical is selected as a COPC if the maximum detected concentration exceeds the background value, the risk-based COPC screening level and/or an ARAR/TBC(s).
7 Naphthalene is used as a surrogate for 2-methylnaphthalene.
8 Acenaphthene is used as a surrogate for acenaphthylene.
9 Pyrene is used as a surrogate for benzo(g,h,i)perylene and phenanthrene.
10 Chlordane is used as a surrogate for alpha-chlordane and gamma-chlordane.
11 Hexavalent chromium.
12 OSWER soil screening level for residential land use (EPA, 1994)
13 Value is for cis-1,2-dichloroethene.

Associated Samples:
S3SS3SB0101
S3SS3SB0201
S3SB3SB0301
S3SS3SB0301
S3SS3SB0301-D
S3SB3TW2701
S3SS3TW2701
S3SB3TW2801
S3SS3TW2801
S3SB3TW2901
S3SS3TW2901

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered.
C = Carcinogen.
COPC = Chemical of Potential Concern.
J = Estimated Value.
N = Noncarcinogen.
NA = Not Applicable.
SAT = Soil Saturation
SSL-INH = Soil Screening Level for transfers from soil to air (inhalation) (EPA, 1996).
CTRESSOIL - CTDEP Remediation Standard Regulations for residential soils.

Rationale Codes:
For Selection as a COPC:
ASL = Above COPC Screening Level/ARAR/TBC.

For Elimination as a COPC:
BKG = Less than Background Levels.
BSL = Below COPC Screening Level/ARAR/TBC
NUT = Essential Nutrient.
NTX = No Toxicity Information.
EPAI = USEPA Region 1 does not advocate evaluation of this chemical.

TABLE 2-2

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE/SUBSURFACE SOIL AT SITE 3 - NSA
MIGRATION PATHWAYS
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Scenario Timeframe: Current/Future
Medium: Surface/Subsurface Soil
Exposure Medium: Surface/Subsurface Soil
Exposure Point: Site 3

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	EPA SSL-Soil to GW(5)	CTDEP Mobility Criteria(6)	CTDEP Soil Vapor Volatilization(6)	COPC Flag(7)	Rationale for Contaminant Deletion or Selection
Volatile Organic Compounds																
67-64-1	Acetone	90	J	130	J	UG/KG	S3SB3TW2801	2/2	NA	130	NA	15000	140000	2400000	NO	BSL
156-59-2	cis-1,2-Dichloroethene	1	J	1	J	UG/KG	S3SB3SB0301	1/10	5 - 7	1	NA	400	NA	NA	NO	BSL
108-88-3	Toluene	3	J	3	J	UG/KG	S3SB3TW2801	1/10	5 - 7	3	NA	12000	67000	760000	NO	BSL
540-59-0	Total 1,2-Dichloroethene	1	J	1	J	UG/KG	S3SB3SB0301	1/10	11 - 14	1	NA	NA	NA	NA	NO	NTX
79-01-6	Trichloroethene	2	J	6	J	UG/KG	S3SB3TW2801	2/10	2 - 7	6	NA	57	1000	7000	NO	BSL
Semivolatile Organic Compounds																
91-57-6	2-Methylnaphthalene	16	J	16	J	UG/KG	S3SS3TW2901	1/10	340 - 3600	16	NA	NA	9800	NA	NO	BSL
83-32-9	Acenaphthene	33	J	59	J	UG/KG	S3SS3TW2901	2/10	340 - 3600	59	NA	630000	84000	NA	NO	BSL
208-96-8	Acenaphthylene	25	J	310	J	UG/KG	S3SS3TW2901	4/10	340 - 3600	310	NA	NA	84000	NA	NO	BSL
120-12-7	Anthracene	310	J	310	J	UG/KG	S3SS3TW2901	1/10	340 - 3600	310	NA	13000000	400000	NA	NO	BSL
56-55-3	Benzo(a)anthracene	36	J	1800		UG/KG	S3SS3TW2901	7/10	340 - 3600	1800	NA	2000	1000	NA	YES	ASL
50-32-8	Benzo(a)pyrene	48	J	2000		UG/KG	S3SS3TW2901	5/10	340 - 3600	2000	NA	8200	1000	NA	YES	ASL
205-99-2	Benzo(b)fluoranthene	74	J	2600		UG/KG	S3SS3TW2901	5/10	340 - 3600	2600	NA	5000	1000	NA	YES	ASL
191-24-2	Benzo(g,h,i)perylene	87	J	1200		UG/KG	S3SS3TW2901	5/10	340 - 3600	1200	NA	NA	42000	NA	NO	BSL
207-08-9	Benzo(k)fluoranthene	35	J	1000		UG/KG	S3SS3TW2901	4/10	340 - 3600	1000	NA	49000	1000	NA	NO	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	29	J	1200		UG/KG	S3SS3SB0301-D	9/10	450 - 3600	1200	NA	3600000	11000	NA	NO	BSL
86-74-8	Carbazole	140	J	140	J	UG/KG	S3SS3TW2901	1/10	340 - 3600	140	NA	590	1000	NA	NO	BSL
218-01-9	Chrysene	38	J	1800		UG/KG	S3SS3TW2901	7/10	340 - 3600	1800	NA	160000	1000	NA	YES	ASL
53-70-3	Dibenzo(a,h)anthracene	480		480		UG/KG	S3SS3TW2901	1/10	340 - 3600	480	NA	2000	1000	NA	NO	BSL
132-64-9	Dibenzofuran	34	J	52	J	UG/KG	S3SS3TW2901	2/10	340 - 3600	52	NA	48000	5600	NA	NO	BSL
206-44-0	Fluoranthene	48	J	2400		UG/KG	S3SS3TW2901	8/10	340 - 890	2400	NA	6300000	56000	NA	NO	BSL
86-73-7	Fluorene	67	J	91	J	UG/KG	S3SS3TW2901	2/10	340 - 3600	91	NA	810000	56000	NA	NO	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	100	J	1200		UG/KG	S3SS3TW2901	5/10	340 - 3600	1200	NA	14000	1000	NA	YES	ASL
91-20-3	Naphthalene	14	J	14	J	UG/KG	S3SS3TW2901	1/10	340 - 3600	14	NA	61000	56000	NA	NO	BSL
85-01-8	Phenanthrene	33	J	1300		UG/KG	S3SS3TW2901	7/10	340 - 890	1300	NA	NA	40000	NA	NO	BSL
129-00-0	Pyrene	70	J	3600		UG/KG	S3SS3TW2901	8/10	340 - 890	3600	NA	4800000	40000	NA	NO	BSL
Pesticides/PCBs																
72-54-8	4,4'-DDD	2.9	J	210		UG/KG	S3SS3TW2701	9/10	3.4	210	NA	14000	NA	NA	NO	BSL
72-55-9	4,4'-DDE	0.87	J	770		UG/KG	S3SS3TW2701	10/10	NA	770	NA	45000	NA	NA	NO	BSL
50-29-3	4,4'-DDT	1.8	J	1700		UG/KG	S3SS3TW2701	9/10	4.5	1700	NA	26000	NA	NA	NO	BSL
319-84-6	Alpha BHC	1.7	J	1.7	J	UG/KG	S3SS3TW2901	1/10	1.7 - 56	1.7	NA	0.72	NA	NA	YES	ASL
5103-71-9	Alpha-Chlordane	9.8	J	12	J	UG/KG	S3SS3SB0301-D	2/10	1.8 - 56	12	NA	10000	66	NA	NO	BSL
11096-82-5	Aroclor-1260	55		69		UG/KG	S3SS3SB0301-D	2/10	18 - 23	69	NA	1000	NA	NA	NO	BSL
5103-74-2	Gamma-Chlordane	9.3	J	13	J	UG/KG	S3SS3SB0301-D	2/10	1.8 - 56	13	NA	NA	66	NA	NO	BSL
72-43-5	Methoxychlor	4.1	J	4.1	J	UG/KG	S3SB3TW2801	1/10	17 - 560	4.1	NA	160000	8000	NA	NO	BSL
Total Metals																
7429-90-5	Aluminum	2730		16000		MG/KG	S3SB3TW2801	10/10	NA	16000	17600	NA	NA	NA	NO	NTX, BKG
7440-36-0	Antimony	0.53	J	0.53	J	MG/KG	S3SS3SB0301	1/1	NA	0.53	2.05	5.4	NA	NA	NO	BSL, BKG
7440-38-2	Arsenic	0.43	J	3.9		MG/KG	S3SB3TW2701	10/10	NA	3.9	3.6	5.8	NA	NA	NO	BSL
7440-39-3	Barium	16.3		127		MG/KG	S3SB3TW2801	10/10	NA	127	57.5	1600	NA	NA	NO	BSL
7440-43-9	Cadmium	3.7		3.7		MG/KG	S3SS3SB0301	1/10	0.42 - 1.6	3.7	0.21	7.5	NA	NA	NO	BSL
7440-70-2	Calcium	254		3420	J	MG/KG	S3SB3TW2801	10/10	NA	3420	1540	NA	NA	NA	NO	NUT
7440-47-3	Chromium(8)	4.3		19.3		MG/KG	S3SB3TW2801	10/10	NA	19.3	21.5	38	NA	NA	NO	BSL, BKG
7440-48-4	Cobalt	2.4		17.1		MG/KG	S3SB3TW2801	7/10	5.5 - 6.1	17.1	8	NA	NA	NA	NO	NTX
7440-50-8	Copper	6.8		65.6		MG/KG	S3SS3SB0301	10/10	NA	65.6	29.8	11000	NA	NA	NO	BSL
7439-89-6	Iron	3700		27700		MG/KG	S3SB3TW2801	10/10	NA	27700	17300	NA	NA	NA	NO	NTX
7439-92-1	Lead	1.9		192	J	MG/KG	S3SS3SB0301	10/10	NA	192	179	NA	NA	NA	NO	NTX
7439-95-4	Magnesium	1120		9460		MG/KG	S3SB3TW2801 -	10/10	NA	9460	3030	NA	NA	NA	NO	NUT
7439-96-5	Manganese	126		573	J	MG/KG	S3SB3TW2801	10/10	NA	573	185	2200	NA	NA	NO	BSL
7439-97-6	Mercury	0.09		3	J	MG/KG	S3SS3SB0301	6/10	0.02 - 0.18	3	0.1	2.1	NA	NA	YES	ASL
7440-02-0	Nickel	11.2	J	19.4	J	MG/KG	S3SS3SB0301	3/10	3.2 - 12.8	19.4	21.4	950	NA	NA	NO	BSL
7440-09-7	Potassium	992		6210		MG/KG	S3SB3TW2801	9/10	1150	6210	2540	NA	NA	NA	NO	NUT

TABLE 2-2

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE/SUBSURFACE SOIL AT SITE 3 - NSA
MIGRATION PATHWAYS
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT
PAGE 2 OF 2

CAS Number	Chemical	Minimum Concentration [1]	Minimum Qualifier	Maximum Concentration [1]	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Nondetects[2]	Concentration Used for Screening[3]	Background Value[4]	EPA SSL-Soil to GW[5]	CTDEP Mobility Criteria[6]	CTDEP Soil Vapor Volatilization[6]	COPC Flag[7]	Rationale for Contaminant Deletion or Selection
7782-49-2	Selenium	0.53	J	0.72	J	MG/KG	S3SS3SB0301	7/10	0.4 - 0.52	0.72	0.445	5.2	NA	NA	NO	BSL
7440-22-4	Silver	0.26	J	1.8		MG/KG	S3SS3SB0301	3/10	0.17 - 0.27	1.8	0.385	31	NA	NA	NO	BSL
7440-23-5	Sodium	56.5		193		MG/KG	S3SB3TW2801	9/10	76.4 - 87.2	193	29.5	NA	NA	NA	NO	NUT
7440-62-2	Vanadium	6		335	J	MG/KG	S3SS3SB0301	10/10	NA	335	35.1	5100	NA	NA	NO	BSL
7440-66-6	Zinc	13.8		902		MG/KG	S3SS3SB0301-D	10/10	NA	902	31.3	14000	NA	NA	NO	BSL
Miscellaneous Parameters																
TTNUS046	Total Solids	74		97		%	S3SB3TW2901	10/10	NA	97	NA	NA	NA	NA	NO	NTX

A shaded value indicates that the concentration used for screening exceeds the criterion or background value.
A shaded chemical name indicates that the chemical has been selected as a COPC.

Footnotes:

1 Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations.
2 Values presented are sample-specific quantitation limits.
3 The maximum detected concentration is used for screening purposes.
4 Atlantic, 1995. Background concentrations of Inorganics in Soil - Naval Submarine Base - New London. If the maximum detected concentration of an inorganic is less than the background concentration, then that metal is not selected as a COPC.
5 EPA Soil Screening Guidance, 1996.
6 CTDEP RSRs, 1996.
7 The chemical is selected as a COPC if the maximum detected concentration exceeds the background value, the risk-based COPC screening level and/or an ARAR/TBC(s).
8 Hexavalent chromium.

Associated Samples:
S3SS3SB0101
S3SS3SB0201
S3SB3SB0301
S3SS3SB0301
S3SS3SB0301-D
S3SB3TW2701
S3SS3TW2701
S3SB3TW2801
S3SS3TW2801
S3SB3TW2901
S3SS3TW2901

Definitions:
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered.
C = Carcinogen.
COPC = Chemical of Potential Concern.
E = Estimated Value.
N = Noncarcinogen
NA = Not Applicable.

Rationale Codes:
For Selection as a COPC:
ASL = Above COPC Screening Level/ARAR/TBC.

For Elimination as a COPC:
BKG = Less than Background Levels.
BSL = Below COPC Screening Level/ARAR/TBC.
NUT = Essential Nutrient.
NTX = No Toxicity Information.

TABLE 2-3

SUMMARY OF DGI CANCER RISKS AND HAZARD INDICES FOR SITE 3 - NSA
REASONABLE MAXIMUM EXPOSURES
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-5}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-5}$	Hazard Index	Chemicals with HI > 1
Construction Worker	Surface/Subsurface Soil	Ingestion	6.0E-07	--	--	--	0.08	--
		Dermal Contact	9.4E-08	--	--	--	0.001	--
		Total	7.0E-07	--	--	--	0.09	--
Full-Time Employee	Surface Soil	Ingestion	3.9E-06	--	--	Benzo(a)pyrene, Arsenic	0.03	--
		Dermal Contact	2.9E-06	--	--	Benzo(a)pyrene	0.002	--
		Total	6.9E-06	--	--	Benzo(a)pyrene, Dibenzo(a,h)anthracene, Arsenic	0.03	--
Adolescent Trespasser	Surface Soil	Ingestion	2.0E-06	--	--	--	0.04	--
		Dermal Contact	1.3E-06	--	--	--	0.002	--
		Total	3.3E-06	--	--	Benzo(a)pyrene	0.04	--
Child Resident	Surface/Subsurface Soil	Ingestion	8.8E-06	--	--	Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Arsenic	0.3	--
		Dermal Contact	1.7E-06	--	--	Benzo(a)pyrene	0.004	--
		Total	1.1E-05	--	--	Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Arsenic	0.3	--
Adult Resident	Surface/Subsurface Soil	Ingestion	3.8E-06	--	--	Benzo(a)pyrene, Arsenic	0.03	--
		Dermal Contact	9.9E-07	--	--	--	0.0006	--
		Total	4.8E-06	--	--	Benzo(a)pyrene, Arsenic	0.03	--

Taken from the Basewide Groundwater Operable Unit Remedial Investigation Update/Feasibillty Study (TtNUS, 2004).

TABLE 2-4

SUMMARY OF DGI CANCER RISKS AND HAZARD INDICES FOR SITE 3 - NSA
CENTRAL TENDENCY EXPOSURES
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Receptor	Media	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $> 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-4}$	Chemicals with Cancer Risks $> 10^{-6}$ and $\leq 10^{-6}$	Hazard Index	Chemicals with HI > 1
Construction Worker	Surface/Subsurface Soil	Ingestion	2.0E-07	--	--	--	0.03	--
		Dermal Contact	6.3E-09	--	--	--	0.00009	--
		Total	2.1E-07	--	--	--	0.03	--
Full-Time Employee	Surface Soil	Ingestion	4.7E-07	--	--	--	0.01	--
		Dermal Contact	7.1E-08	--	--	--	0.0002	--
		Total	5.4E-07	--	--	--	0.01	--
Adolescent Trespasser	Surface Soil	Ingestion	1.3E-07	--	--	--	0.008	--
		Dermal Contact	5.0E-08	--	--	--	0.0002	--
		Total	1.8E-07	--	--	--	0.008	--
Child Resident	Surface/Subsurface Soil	Ingestion	1.5E-06	--	--	--	0.1	--
		Dermal Contact	1.0E-07	--	--	--	0.0007	--
		Total	1.6E-06	--	--	--	0.1	--
Adult Resident	Surface/Subsurface Soil	Ingestion	5.5E-07	--	--	--	0.01	--
		Dermal Contact	4.1E-08	--	--	--	0.00009	--
		Total	5.9E-07	--	--	--	0.01	--

Taken from the Basewide Groundwater Operable Unit Remedial Investigation Update/Feasibility Study (TtNUS, 2004).

TABLE 2-5

SOURCES OF ECOLOGICAL SURFACE SOIL SCREENING VALUES
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT
PAGE 1 OF 2

Chemicals Detected in Surface Soils	ORNL Plant	ORNL Earthworm	Canadian SQG	Dutch Target Value	Value Used for Screening
Semivolatile Organics (µg/kg)					
2-METHYLNAPHTHALENE				1,000[1]	1,000
ACENAPHTHENE	20,000			1,000[1]	1,000
ACENAPHTHYLENE				1,000[1]	1,000
ANTHRACENE				1,000[1]	1,000
BENZO(A)ANTHRACENE				1,000[1]	1,000
BENZO(A)PYRENE			700	1,000[1]	1,000
BENZO(B)FLUORANTHENE				1,000[1]	1,000
BENZO(G,H,I)PERYLENE				1,000[1]	1,000
BENZO(K)FLUORANTHENE				1,000[1]	1,000
BIS(2-ETHYLHEXYL)PHTHALATE				100[2]	100
CARBAZOLE					NA
CHRYSENE				1,000[1]	1,000
DIBENZO(A,H)ANTHRACENE				1,000[1]	1,000
DIBENZOFURAN					NA
FLUORANTHENE				1,000[1]	1,000
FLUORENE		30,000		1,000[1]	1,000
INDENO(1,2,3-CD)PYRENE				1,000[1]	1,000
NAPHTHALENE			600	1,000[1]	1,000
PHENANTHRENE				1,000[1]	1,000
PYRENE				1,000[1]	1,000
TOTAL PAH				1000	1000
Pesticides/PCBs (µg/kg)					
4,4'-DDD				10[3]	5,000[3,4]
4,4'-DDE				10[3]	5,000[3,4]
4,4'-DDT				10[3]	5,000[3,4]
TOTAL DDT					5,000[3,4]
ALPHA-BHC				3	3
ALPHA-CHLORDANE				0.03	0.03
AROCLOR-1260	40,000			20[5]	20
GAMMA-CHLORDANE				0.03	0.03
Inorganics (mg/kg)					
ALUMINUM	50				50
ANTIMONY	5			3	3
ARSENIC	10	60	19	29	10
BARIUM	500			160	160
CADMIUM	4	20	3.8	0.8	0.8
CALCIUM					NA
CHROMIUM	1	0.4	64	100	0.4
COBALT	20			9	9
COPPER	100	50	63	36	36
IRON					NA
LEAD	50	500	70	85	50

TABLE 2-5

SOURCES OF ECOLOGICAL SURFACE SOIL SCREENING VALUES
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT
PAGE 2 OF 2

Chemicals Detected in Surface Soils	ORNL Plant	ORNL Earthworm	Canadian SQG	Dutch Target Value	Value Used for Screening
MAGNESIUM					NA
MANGANESE	500				500
MERCURY	0.3	0.1	10	0.3	0.1
NICKEL	30	200		35	30
POTASSIUM					NA
SELENIUM	1	70		0.7	0.7
SILVER	2				2
SODIUM					NA
VANADIUM	2		130	42	2
ZINC	50	200	200	140	50

Footnotes:

1 Value for total PAHs. PAHs will be evaluated by comparing the total PAH concentration to 1,000.

2 Value for total phthalates. Bis(2-ethylhexyl)phthalate will be evaluated by comparing the maximum concentration to 100.

3 Value for total DDD/DDE/DDT.

4 Value for NLON site-specific remedial goal (B&RE, 1997).

5 Value includes the sum of seven PCBs, including Aroclor-1260.

Notes:

Information extracted from Basewide Groundwater OU RI Update/FS (TtNUS, 2004)

Value used for screening is the lowest of the available sources.

NA = No screening value available.

ORNL Plant - Oak Ridge National Laboratory screening benchmark concentrations for chemical phytotoxicity (Efroymson, et al., 1997a).

ORNL Earthworm - Oak Ridge National Laboratory screening benchmark concentration for chemical toxicity to earthworms (Efroymson, et al., 1997b).

Canadian SQG - Canadian Soil Quality Guideline (CCME, 1997).

Dutch Target Value (MHSPE, 2000).

TABLE 2-6

SOURCES OF ECOLOGICAL SEDIMENT SCREENING VALUES
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Chemical Detected in Surface Soil	Consensus-Based TEC	Consensus-Based PEC	Lower Effects Levels[1]	Higher Effects Levels[1]	New London PRG[7]	Sediment Screening Value[8]
Semivolatile Organics (µg/kg)						
BIS(2-ETHYLHEXYL)PHTHALATE	--	--	--	--	--	--
CARBAZOLE	--	--	--	--	--	--
DIBENZOFURAN	--	--	--	--	--	--
TOTAL PAH	1,610	22,800	NA	NA	--	1,610
Pesticides/PCBs (µg/kg)						
TOTAL DDT	5.28	572	NA	NA	2,000	2,000
ALPHA-BHC	2.37	4.99	NA	NA	--	2.37
ALPHA-CHLORDANE	3.24	17.6	NA	NA	--	3.24
AROCLOR-1260	59.8	676	NA	NA	--	59.8
GAMMA-CHLORDANE	3.24	17.6	NA	NA	--	3.24
Inorganics (mg/kg)						
ALUMINUM	--	--		58,030[4]	--	58,030
ANTIMONY	--	--	2[5]	25[5]	--	2
ARSENIC	9.79	33.0	NA	NA	70.0	9.79
BARIUM	--	--	48[2]	--	--	48
CADMIUM	0.99	4.98	NA	NA	9.6	0.99
CALCIUM	--	--	--	--	--	--
CHROMIUM	43	111	NA	NA	370	43
COBALT	--	--	10[2]	--	--	10
COPPER	32	149	NA	NA	270	32
IRON	--	--	20,000[6]	40,000[6]	--	20,000
LEAD	36	128	NA	NA	218	36
MAGNESIUM	--	--	--	--	--	--
MANGANESE	--	--	460[6]	1100[6]	--	460
MERCURY	0.180	1.06	NA	NA	0.710	0.18
NICKEL	22.7	48.6	NA	NA	51.6	22.7
POTASSIUM	--	--	--	--	--	--
SELENIUM	--	--	1[2]	--	--	1
SILVER	--	--	1[3]	3.7[3]	3.70	1
SODIUM	--	--	--	--	--	--
VANADIUM	--	--	57[2]	--	--	57
ZINC	121	459	NA	NA	410	121

Notes:
"--" Unavailable
NA - Not Applicable
TEC = Threshold Effect Concentration
PEC = Probable Effect Concentration

Footnotes:
1 These values are provided only for chemicals that do not have TECs or PECs.
2 Apparent Effects Threshold (AET) (marine value) from Buchman, 1999.
3 Effects Range-Low (ERL) and Effects Range-Medium (ERM) from Long et al., 1995.
4 Probable Effects Concentration (PEC) from Assessment and Remediation of Contaminated Sediments Program (USEPA, 1996).
5 ERL and ERM values from Long and Morgan, 1991.
5 Total DDT Preliminary Remediation Goal (PRG) is based on site-specific toxicity data; Inorganic chemical PRGs are ER-M values from Long et al., 1995
6 Low Effects Level (LEL) or Severe Effects Level (SEL) from OMOE, 1993.
7 NLON PRG from Brown & Root Environmental, 1997.
8 The selected sediment screening value is the lowest of the available sources.

TABLE 2-7

SELECTION OF ECOLOGICAL COPCs IN SURFACE SOIL
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Chemical Detected in Surface Soil	Detection Frequency[1]	Minimum Concentration[2]	Maximum Concentration[2]	Sample Containing Maximum Concentration	Average of Positive Results	Average of All Results[3]	Background Concentration[4]	Surface Soil Screening Value	Ecological Effects Quotient[5]	Retain as a COPC?	Rationale for Chemical Selection or Elimination[6]
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE	1/6	16 J	16 J	S3SS3TW2901	16	300	--	--[7]	--	YES	ASL
ACENAPHTHENE	1/6	59 J	59 J	S3SS3TW2901	59	307	--	--[7]	--	YES	ASL
ACENAPHTHYLENE	3/6	25 J	310 J	S3SS3TW2901	124	161	--	--[7]	--	YES	ASL
ANTHRACENE	1/6	310 J	310 J	S3SS3TW2901	310	349	--	--[7]	--	YES	ASL
BENZO(A)ANTHRACENE	5/6	46 J	1800	S3SS3TW2901	417	513	--	--[7]	--	YES	ASL
BENZO(A)PYRENE	4/6	48 J	2000	S3SS3TW2901	567	581	--	--[7]	--	YES	ASL
BENZO(B)FLUORANTHENE	5/6	74 J	2600	S3SS3TW2901	616	678	--	--[7]	--	YES	ASL
BENZO(G,H,I)PERYLENE	4/6	87 J	1200	S3SS3TW2901	427	487	--	--[7]	--	YES	ASL
BENZO(K)FLUORANTHENE	4/6	35 J	1000	S3SS3TW2901	286	393	--	--[7]	--	YES	ASL
BIS(2-ETHYLHEXYL)PHTHALATE	5/6	34 J	1200	S3SS3SB0301-D	359	337	--	100	12	YES	ASL
CARBAZOLE	1/6	140 J	140 J	S3SS3TW2901	140	321	--	NA	--	YES	NTX
CHRYSENE	5/6	38 J	1800	S3SS3TW2901	424	518	--	--[7]	--	YES	ASL
DIBENZO(A,H)ANTHRACENE	1/6	480	480	S3SS3TW2901	480	378	--	--[7]	--	YES	ASL
DIBENZOFURAN	1/6	52 J	52 J	S3SS3TW2901	52	306	--	NA	--	YES	NTX
FLUORANTHENE	6/6	60 J	2400	S3SS3TW2901	534	534	--	--[7]	--	YES	ASL
FLUORENE	1/6	91 J	91 J	S3SS3TW2901	91	313	--	--[7]	--	YES	ASL
INDENO(1,2,3-CD)PYRENE	4/6	100 J	1200	S3SS3TW2901	448	501	--	--[7]	--	YES	ASL
NAPHTHALENE	1/6	14 J	14 J	S3SS3TW2901	14	300	--	--[7]	--	YES	ASL
PHENANTHRENE	6/6	33 J	1300	S3SS3TW2901	305	305	--	--[7]	--	YES	ASL
PYRENE	6/6	91 J	3600	S3SS3TW2901	761	761	--	--[7]	--	YES	ASL
TOTAL PAH	--	--	20180	S3SS3TW2901	--	--	--	1000	20	YES	ASL
Pesticides/PCBs (µg/kg)											
4,4'-DDD	6/6	6.2 J	210	S3SS3TW2701	53.8	53.8	--	--[8]	--	NO	BSL
4,4'-DDE	6/6	12 J	770	S3SS3TW2701	221	221	--	--[8]	--	NO	BSL
4,4'-DDT	6/6	35 J	1700	S3SS3TW2701	533	533	--	--[8]	--	NO	BSL
TOTAL DDTR	--	--	2,680	S3SS3TW2701	--	--	--	5,000	0.54	NO	BSL
ALPHA-BHC	1/6	1.7 J	1.7 J	S3SS3TW2901	1.7	11.1	--	3	0.57	NO	BSL
ALPHA-CHLORDANE	1/6	12 J	12 J	S3SS3SB0301-D	12	12.1	--	0.03	400	YES	ASL
AROCLOR-1260	1/6	55	69	S3SS3SB0301-D	62	18.7	--	20	3.5	YES	ASL
GAMMA-CHLORDANE	1/6	13 J	13 J	S3SS3SB0301-D	13	12.2	--	0.03	433	YES	ASL
Inorganics (mg/kg)											
ALUMINUM	6/6	6330	13300	S3SS3SB0101	9603	9603	17,600	50	266	YES	ASL
ANTIMONY	1/1	0.53 J	0.53 J	S3SS3SB0301	0.53	0.53	2.05	3	0.18	NO	BSL
ARSENIC	6/6	2.4	3.8	S3SS3SB0101	3.17	3.17	3.6	10	0.38	NO	BSL
BARIUM	6/6	27.9	79.7	S3SS3SB0301	47.4	47.4	39	160	0.498	NO	BSL
CADMIUM	1/6	3.7	3.7	S3SS3SB0301	2.25	0.67	0.24	0.8	4.6	YES	ASL
CALCIUM	6/6	731	2960	S3SS3SB0301	1350	1350	314	NA	--	NO	EN
CHROMIUM	6/6	12.1	19.2	S3SS3SB0101	15.9	15.9	19.3	0.4	48	YES	ASL

TABLE 2-7

SELECTION OF ECOLOGICAL COPCs IN SURFACE SOIL
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT

Chemical Detected in Surface Soil	Detection Frequency[1]	Minimum Concentration[2]	Maximum Concentration[2]	Sample Containing Maximum Concentration	Average of Positive Results	Average of All Results[3]	Background Concentration[4]	Surface Soil Screening Value	Ecological Effects Quotient[5]	Retain as a COPC?	Rationale for Chemical Selection or Elimination[6]
COBALT	4/6	4.1	8.6	S3SS3SB0201	6.9	5.54	7	9	0.96	NO	BSL
COPPER	6/6	16.4	65.6	S3SS3SB0301	25.7	25.7	17.9	36	1.8	YES	ASL
IRON	6/6	9060	16300	S3SS3SB0101	12518	12518	16,800	NA	--	YES	NTX
LEAD	6/6	12.2 J	192 J	S3SS3SB0301	43.9	43.9	17.5	50	3.8	YES	ASL
MAGNESIUM	6/6	2280	3930	S3SS3SB0201	3073	3073	2,460	NA	--	NO	EN
MANGANESE	6/6	139 J	408 J	S3SS3SB0301	203	203	172	500	0.82	NO	BSL
MERCURY	4/6	0.09	3 J	S3SS3SB0301	1.14	0.78	0.055	0.1	30	YES	ASL
NICKEL	3/6	11.2 J	19.4 J	S3SS3SB0301	12.2	8.8	5	30	0.65	NO	BSL
POTASSIUM	6/6	1230	2320	S3SS3SB0201	1671	1671	669	NA	--	NO	EN
SELENIUM	4/6	0.57 J	0.72 J	S3SS3SB0301	0.57	0.46	0.445	0.7	1.03	YES	ASL
SILVER	2/6	1.1	1.8	S3SS3SB0301	1.33	0.52	0.385	2	0.9	NO	BSL
SODIUM	6/6	99	121	S3SS3TW2801	103	103	16.5	NA	--	NO	EN
VANADIUM	6/6	19.3	335 J	S3SS3SB0301	53.1	53.1	33.3	2	168	YES	ASL
ZINC	6/6	37.2	902	S3SS3SB0301-D	181	181	25.6	50	18	YES	ASL

Notes:
"--" Unavailable; background concentrations are not available for organic chemicals and an EEQ could not be calculated due to the lack of a surface soil screening value.
Shaded name indicates that the constituent was selected as a COPC. Shaded values indicate that the site concentration(s) exceeds this particular criterion.
The background concentrations are presented for informational purposes only and were not used in the selection of COPCs.
J = Estimated concentration.

Footnotes:
1 Sample and duplicate were counted as one sample when calculating the frequency of detection.
2 Sample and duplicate were counted as separate samples in determining the minimum and maximum concentrations.
3 The average of all results was calculated using one-half of the reporting limit for non-detected samples.
4 Source of the background concentrations is Atlantic, April 1995. Background concentrations of Inorganics in Soil - NSB-NLON.
5 The ecological effects quotient was calculated by dividing the maximum concentration by the screening value.
6 Rationale codes for contaminant selection or deletion:
For Selection as a COPC:
ASL = Above COPC screening level.
NTX = No toxicity information available.
For Elimination as a COPC:
BSL = Below COPC screening level.
EN = Essential Nutrient
7 PAHs were evaluated by comparing the maximum PAHs concentration in sample S3SB3TW2801 to the total PAHs screening value of 1,000 µg/kg.
8 DDD/DDE/DDT were evaluated by comparing the maximum total DDD/DDE/DDT concentration in sample S3SS3TW2701 to the DDTR screening value of 5,000 µg/kg.

Associated Samples:

S3SS3SB0101	S3SS3TW2701
S3SS3SB0201	S3SS3TW2801
S3SS3SB0301	S3SS3TW2901
S3SS3SB0301-D	

TABLE 2-8

SELECTION OF ECOLOGICAL COPCs IN SEDIMENT
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT
PAGE 1 OF 2

Chemical Detected in Surface Soil	Detection Frequency[1]	Minimum Concentration[2]	Maximum Concentration[2]	Sample Containing Maximum Concentration	Average of Positive Results	Average of All Results[3]	Background Concentration[4]	Sediment Screening Value	Ecological Effects Quotient[5]	Retain as a COPC?	Rationale for Chemical Selection or Elimination[6]
Semivolatile Organics (µg/kg)											
2-METHYLNAPHTHALENE	1/6	16 J	16 J	S3SS3TW2901	16	300	--	--[7]	--	YES	ASL
ACENAPHTHENE	1/6	59 J	59 J	S3SS3TW2901	59	307	--	--[7]	--	YES	ASL
ACENAPHTHYLENE	3/6	25 J	310 J	S3SS3TW2901	124	161	--	--[7]	--	YES	ASL
ANTHRACENE	1/6	310 J	310 J	S3SS3TW2901	310	349	--	--[7]	--	YES	ASL
BENZO(A)ANTHRACENE	5/6	46 J	1800	S3SS3TW2901	417	513	--	--[7]	--	YES	ASL
BENZO(A)PYRENE	4/6	48 J	2000	S3SS3TW2901	567	581	--	--[7]	--	YES	ASL
BENZO(B)FLUORANTHENE	5/6	74 J	2600	S3SS3TW2901	616	678	--	--[7]	--	YES	ASL
BENZO(G,H,I)PERYLENE	4/6	87 J	1200	S3SS3TW2901	427	487	--	--[7]	--	YES	ASL
BENZO(K)FLUORANTHENE	4/6	35 J	1000	S3SS3TW2901	286	393	--	--[7]	--	YES	ASL
BIS(2-ETHYLHEXYL)PHTHALATE	5/6	34 J	1200	S3SS3SB0301-D	359	337	--	NA	--	YES	NTX
CARBAZOLE	1/6	140 J	140 J	S3SS3TW2901	140	321	--	NA	--	YES	NTX
CHRYSENE	5/6	38 J	1800	S3SS3TW2901	424	518	--	--[7]	--	YES	ASL
DIBENZO(A,H)ANTHRACENE	1/6	480	480	S3SS3TW2901	480	378	--	--[7]	--	YES	ASL
DIBENZOFURAN	1/6	52 J	52 J	S3SS3TW2901	52	306	--	NA	--	YES	NTX
FLUORANTHENE	6/6	60 J	2400	S3SS3TW2901	534	534	--	--[7]	--	YES	ASL
FLUORENE	1/6	91 J	91 J	S3SS3TW2901	91	313	--	--[7]	--	YES	ASL
INDENO(1,2,3-CD)PYRENE	4/6	100 J	1200	S3SS3TW2901	448	501	--	--[7]	--	YES	ASL
NAPHTHALENE	1/6	14 J	14 J	S3SS3TW2901	14	300	--	--[7]	--	YES	ASL
PHENANTHRENE	6/6	33 J	1300	S3SS3TW2901	305	305	--	--[7]	--	YES	ASL
PYRENE	6/6	91 J	3600	S3SS3TW2901	761	761	--	--[7]	--	YES	ASL
TOTAL PAH	--	--	20180	S3SS3TW2901	--	--	--	1610	13	YES	ASL
Pesticides/PCBs (µg/kg)											
4,4'-DDD	6/6	6.2 J	210	S3SS3TW2701	53.8	53.8	--	--[8]	--	YES	ASL
4,4'-DDE	6/6	12 J	770	S3SS3TW2701	221	221	--	--[8]	--	YES	ASL
4,4'-DDT	6/6	35 J	1700	S3SS3TW2701	533	533	--	--[8]	--	YES	ASL
TOTAL DDT	--	--	2680	S3SS3TW2701	--	--	--	2000	1.3	YES	ASL
ALPHA-BHC	1/6	1.7 J	1.7 J	S3SS3TW2901	1.7	11.1	--	2.37	0.72	NO	BSL
ALPHA CHLORDANE	1/6	12 J	12 J	S3SS3SB0301-D	12	12.1	--	3.24	3.7	YES	ASL
AROCLOR 1260	1/6	55	69	S3SS3SB0301-D	62	18.7	--	59.8	1.2	YES	ASL
GAMMA-CHLORDANE	1/6	13 J	13 J	S3SS3SB0301-D	13	12.2	--	3.24	4.0	YES	ASL
Inorganics (mg/kg)											
ALUMINUM	6/6	6330	13300	S3SS3SB0101	9603	9603	17,600	58030	0.23	NO	BSL
ANTIMONY	1/1	0.53 J	0.53 J	S3SS3SB0301	0.53	0.53	2.05	2	0.27	NO	BSL
ARSENIC	6/6	2.4	3.8	S3SS3SB0101	3.17	3.17	3.6	9.79	0.39	NO	BSL
BARIUM	6/6	27.9	79.7	S3SS3SB0301	47.4	47.4	39	48	1.7	YES	ASL
CADMIUM	1/6	3.7	3.7	S3SS3SB0301	2.25	0.67	0.24	0.99	3.7	YES	ASL
CALCIUM	6/6	731	2960	S3SS3SB0301	1350	1350	314	NA	--	NO	EN
CHROMIUM	6/6	12.1	19.2	S3SS3SB0101	15.9	15.9	19.3	43	0.45	NO	BSL
COBALT	4/6	4.1	8.6	S3SS3SB0201	6.9	5.54	7	10	0.86	NO	BSL
COPPER	6/6	16.4	65.6	S3SS3SB0301	25.7	25.7	17.9	32	2.1	YES	ASL
IRON	6/6	9060	16300	S3SS3SB0101	12518	12518	16,800	20,000	0.8	NO	BSL

TABLE 2-8

SELECTION OF ECOLOGICAL COPCs IN SEDIMENT
SITE 3 - NSA SOIL ROD
NSB-NLON, GROTON, CONNECTICUT
PAGE 2 OF 2

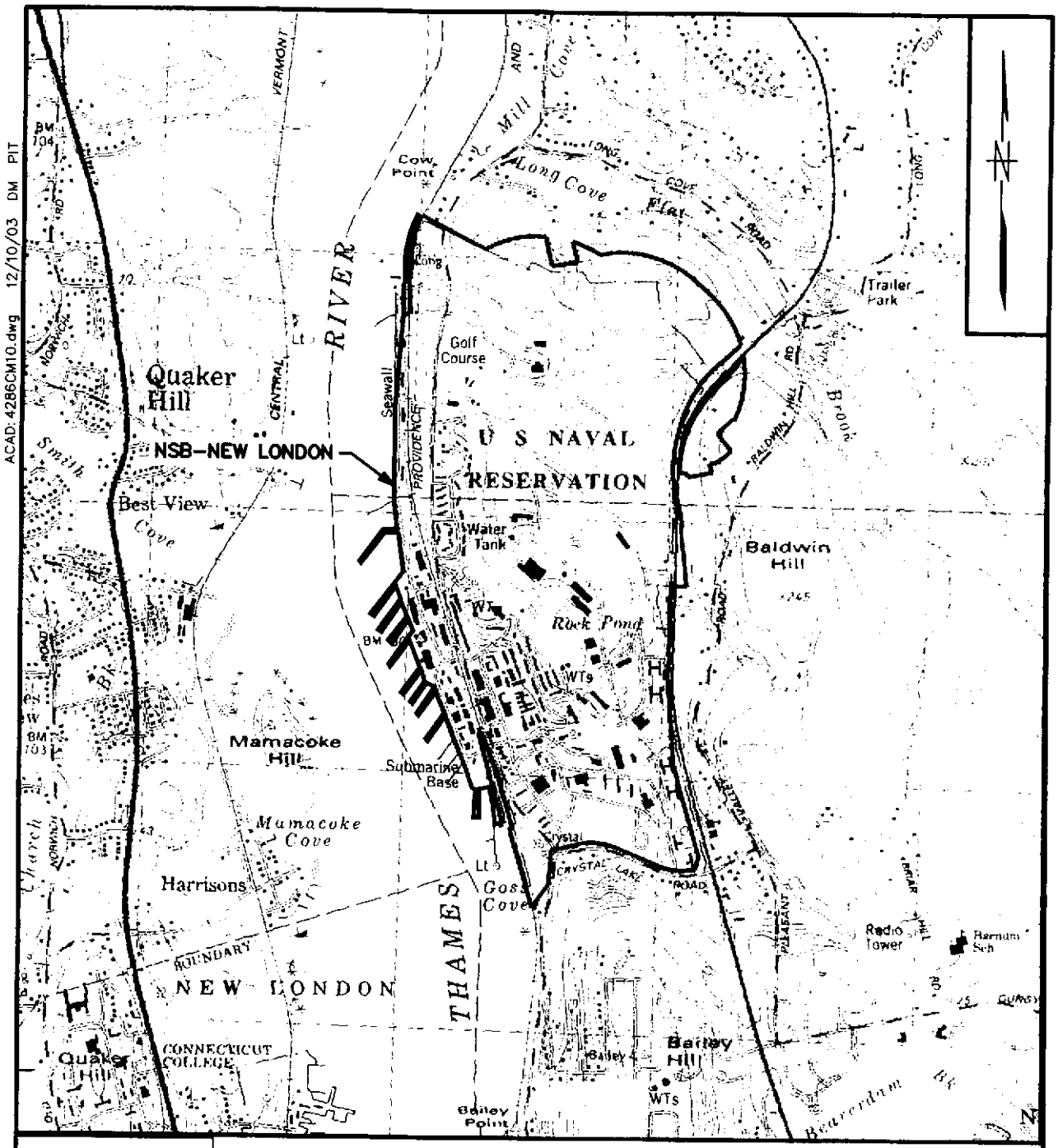
Chemical Detected in Surface Soil	Detection Frequency[1]	Minimum Concentration[2]	Maximum Concentration[2]	Sample Containing Maximum Concentration	Average of Positive Results	Average of All Results[3]	Background Concentration[4]	Sediment Screening Value	Ecological Effects Quotient[5]	Retain as a COPC?	Rationale for Chemical Selection or Elimination[6]
LEAD	6/6	12.2 J	192 J	S3SS3SB0301	43.9	43.9	17.5	36	5.3	YES	ASL
MAGNESIUM	6/6	2280	3930	S3SS3SB0201	3073	3073	2,460	NA	--	NO	EN
MANGANESE	6/6	139 J	408 J	S3SS3SB0301	203	203	172	460	0.89	NO	BSL
MERCURY	4/6	0.09	3 J	S3SS3SB0301	1.14	0.78	0.055	0.18	17	YES	ASL
NICKEL	3/6	11.2 J	19.4 J	S3SS3SB0301	12.2	8.8	5	22.7	0.85	NO	BSL
POTASSIUM	6/6	1230	2320	S3SS3SB0201	1671	1671	669	NA	--	NO	EN
SELENIUM	4/6	0.57 J	0.72 J	S3SS3SB0301	0.57	0.46	0.445	1	0.72	NO	BSL
SILVER	2/6	1.1	1.8	S3SS3SB0301	1.33	0.52	0.385	1	1.8	YES	ASL
SODIUM	6/6	99	121	S3SS3TW2801	103	103	16.5	NA	--	NO	EN
VANADIUM	6/6	19.3	335 J	S3SS3SB0301	53.1	53.1	33.3	57	5.9	YES	ASL
ZINC	6/6	37.2	902	S3SS3SB0301-D	181	181	25.6	121	7.5	YES	ASL

Notes:
"--" Unavailable; background concentrations are not available for organic chemicals and an EEQ could not be calculated due to the lack of a sediment screening value.
Shaded name indicates that the constituent was selected as a COPC. Shaded values indicate that the site concentration(s) exceeds this particular criterion.
Soil concentrations were compared to sediment screening levels for the potential to migrate to Stream 5 based on close proximity.
The background concentrations are presented for informational purposes only and were not used in the selection of COPCs.
J = Estimated concentration.

Footnotes:
1 Sample and duplicate were counted as one sample when calculating the frequency of detection.
2 Sample and duplicate were counted as separate samples in determining the minimum and maximum concentrations.
3 The average of all results was calculated using one-half of the reporting limit for non-detected samples.
4 Source of the background concentrations is Atlantic, April 1995. Background concentrations of Inorganics in Soil - NSB-NLON.
5 The ecological effects quotient was calculated by dividing the maximum concentration by the screening value.
6 Rationale codes for contaminant selection or deletion:
For Selection as a COPC:
ASL = Above COPC screening level.
NTX = No toxicity information available.
For Elimination as a COPC:
BSL = Below COPC screening level.
EN = Essential Nutrient.
7 PAHs were evaluated by comparing the maximum PAHs concentration in sample S3SB3TW2801 to the total PAHs screening value of 1,600 µg/kg.
8 DDD/DDE/DDT were evaluated by comparing the maximum sum DDD/DDE/DDT concentration in sample S3SS3TW2701 to the DDTR screening value of 2,000 µg/kg.

Associated Samples:
S3SS3SB0101
S3SS3SB0201
S3SS3SB0301
S3SS3SB0301-D
S3SS3TW2701
S3SS3TW2801
S3SS3TW2901

Original includes color coding.



CONNECTICUT

QUADRANGLE LOCATION

SOURCE: QUADRANGLE MAP UNCASTVILLE, CONNECTICUT 1984.

DRAWN BY DM DATE 12/10/03	Tetra Tech NUS, Inc.	CONTRACT NO. 2863	OWNER NO. 0816
CHECKED BY DATE		APPROVED BY DATE 12/12/03	
COST/SCHED–AREA	LOCATION MAP NSB–NLON GROTON, CONNECTICUT	APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 2–1	REV. 0

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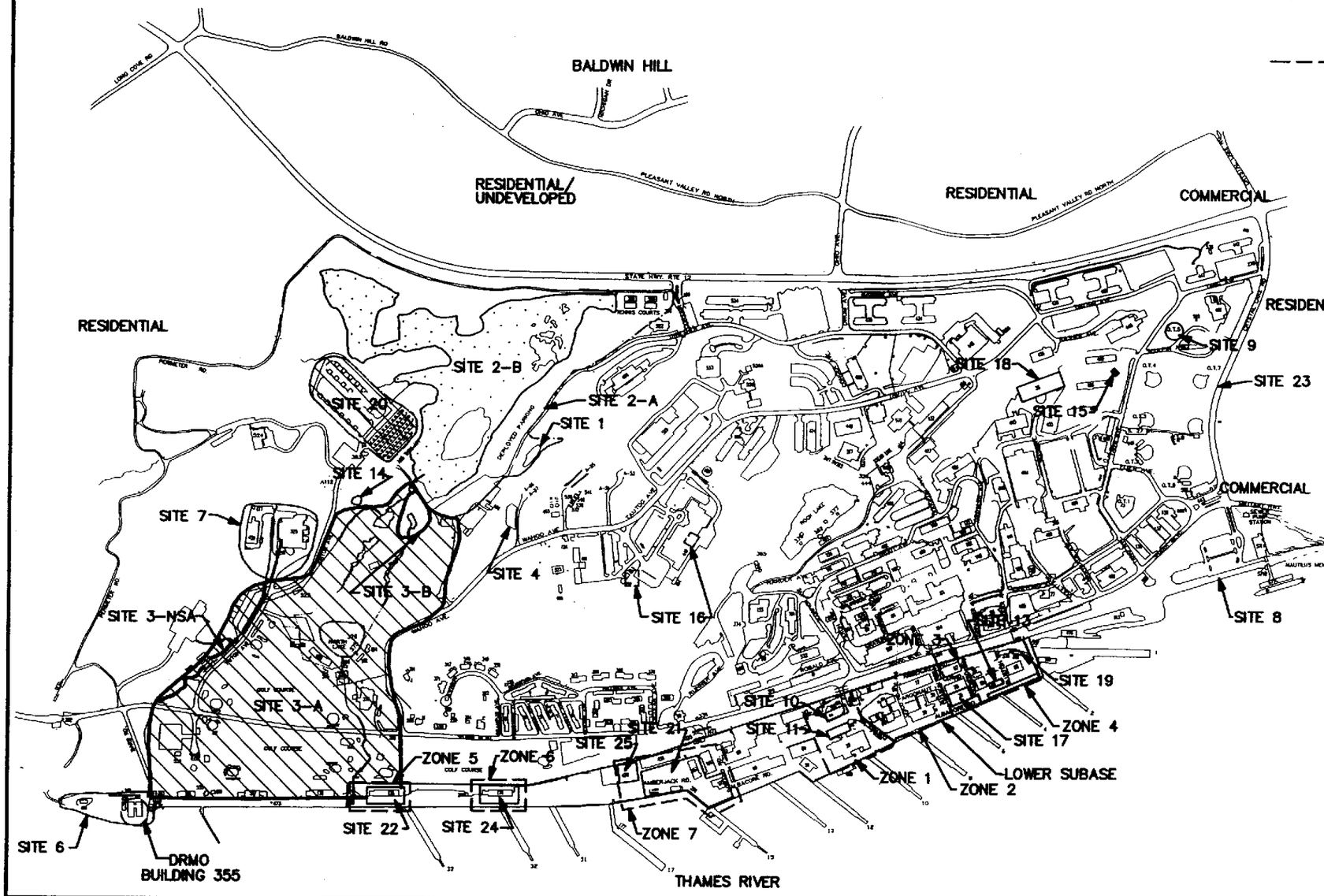

LEGEND:

———— LOWER SUBASE REMEDIAL INVESTIGATION ZONE BOUNDARY

NOTES:

1. SITE AND STUDY AREA LOCATIONS WERE TAKEN FROM THE FOLLOWING REPORTS:
   - FEDERAL FACILITY AGREEMENT UNDER CERCLA 120, NAVAL SUBMARINE BASE, NEW LONDON, CONNECTICUT
   - FINAL INITIAL ASSESSMENT STUDY (ENVIRODYNE, MARCH 1983)
   - HYDROGEOLOGIC INVESTIGATION UNDERGROUND STORAGE TANKS OT-4, OT-7, OT-8, OT-9, AND 54-H (FUSS & O'NEILL, SEPTEMBER 1989)
   - PHASE I REMEDIAL INVESTIGATION (ATLANTIC, AUGUST 1992)
   - SITE CHARACTERIZATION REPORT FOR OT-10, BUILDING 325, AND BUILDING 89 (HNUS, APRIL 1995)
   - DRAFT FINAL SUPPLEMENT TO INITIAL ASSESSMENT STUDY (NAVAL FACILITIES ENGINEERING SERVICE CENTER, APRIL 1995)
   - REMOVAL SITE EVALUATION FOR QUAY WALL (HNUS, MAY 1995)
2. SITE AND STUDY AREA BOUNDRIES ARE APPROXIMATE.

SITE 1 – CONSTRUCTION BATTALION UNIT (CBU) DRUM STORAGE AREA
SITE 2 – (A) AREA A LANDFILL AND (B) AREA A WETLAND
SITE 3 – (A) AREA A DOWNSTREAM WATER COURSES AND (B) OVERBANK DISPOSAL AREA (OBDA) NEW SOURCE AREA (NSA)
SITE 4 – RUBBLE FILL AREA AT BUNKER A-86
SITE 6 – DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO)
SITE 7 – TORPEDO SHOPS
SITE 8 – GOSS COVE LANDFILL
SITE 9 – OILY WASTEWATER TANK (OT-5)
SITE 10 – LOWER SUBASE-FUEL STORAGE TANKS AND TANK 54-H
SITE 11 – LOWER SUBASE-POWER PLANT OIL TANKS
SITE 13 – LOWER SUBASE-BUILDING 79 WASTE OIL PIT
SITE 14 – OVERBANK DISPOSAL AREA NORTHEAST (OBDANE)
SITE 15 – SPENT ACID STORAGE AND DISPOSAL AREA (SASDA)
SITE 16 – HOSPITAL INCINERATORS
SITE 17 – HAZARDOUS MATERIALS/SOLVENT STORAGE AREA (BUILDING 31)
SITE 18 – SOLVENT STORAGE AREA (BUILDING 33)
SITE 19 – SOLVENT STORAGE AREA (BUILDING 36)
SITE 20 – AREA A WEAPONS CENTER
SITE 21 – BERTH 16
SITE 22 – PIER 33
SITE 23 – FUEL FARM
SITE 24 – CENTRAL PAINT ACCUMULATION AREA (BUILDING 174)
SITE 25 – LOWER SUBASE-CLASSIFIED MATERIALS INCINERATOR

0 800 1600
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DATE: DM 12/10/03
CHECKED BY DATE:
COST/SCHED-AREA:
SCALE: AS NOTED

Tetra Tech NUS, Inc.

SITE LOCATION MAP
NSB-NLON
GROTON, CONNECTICUT

CONTRACT NO. 4286 | OWNER NO. 0841
APPROVED BY: PAC | DATE: 12/12/03
APPROVED BY: | DATE:
DRAWING NO. FIGURE 2-2 | REV. 0

FORM CADD NO. TtNUS_BH.DGN – REV 0 – 1/20/98

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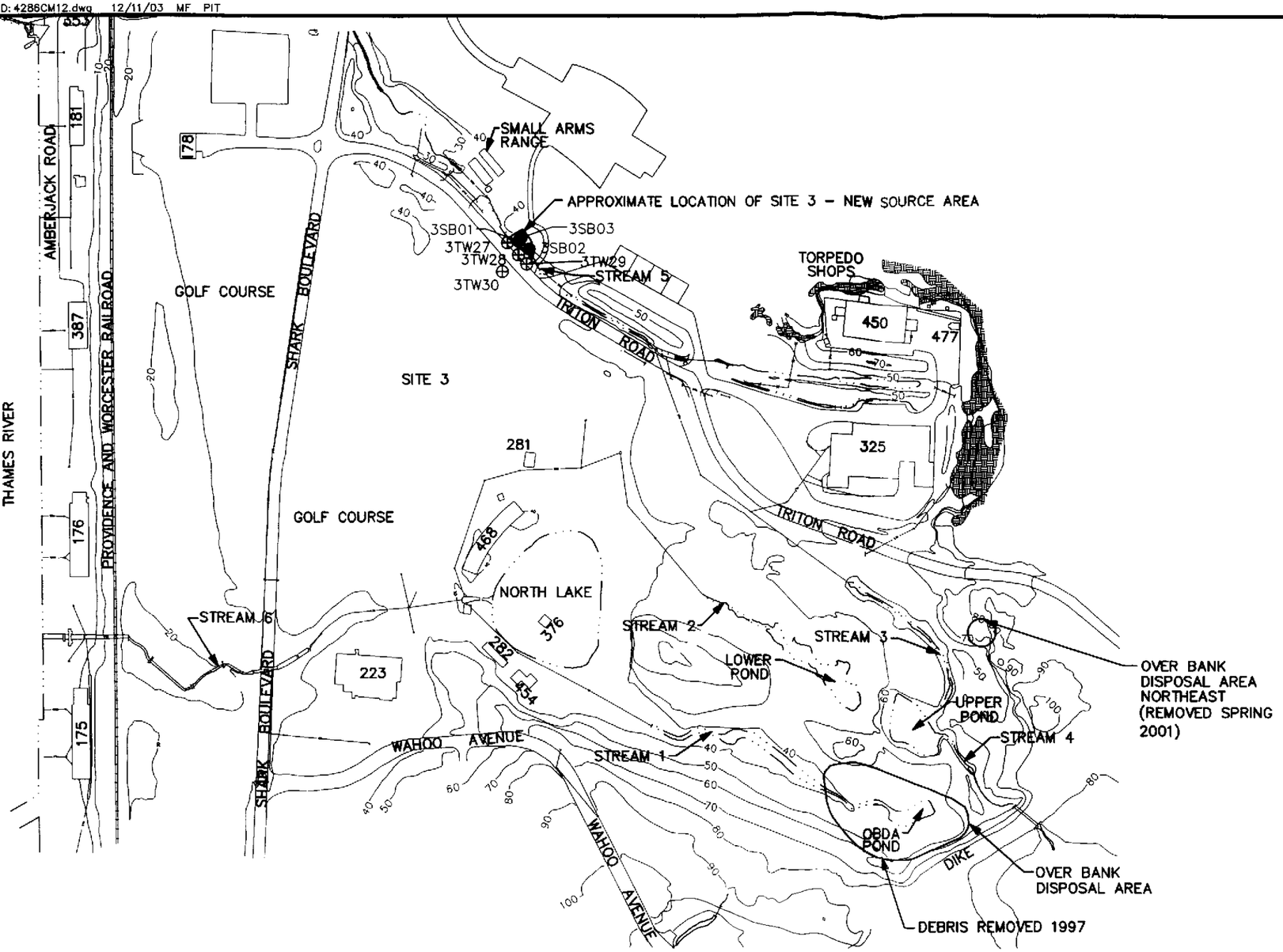

LEGEND:

⊕ 3TW27	TEMPORARY WELL INCLUDED IN GROUNDWATER LEVEL MEASUREMENT AND SAMPLING PROGRAM
● 3SB01	SOIL BORING
—10—	TOPOGRAPHIC CONTOUR (BASE 1982)
325	BUILDING No.
	WATERCOURSE
—STM—	STORM SEWER AND CATCH BASIN
	EXPOSED BEDROCK

0 260 520
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DM DATE 12/11/03
CHECKED BY DATE
COST/SCHED–AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

LOCATION OF SITE 3 – NSA
WITHIN SITE 3
NSB–NLON
GROTON, CONNECTICUT

CONTRACT NO. 4286
OWNER NO. 0841
APPROVED BY CAR DATE 12/12/03
APPROVED BY DATE
DRAWING NO. FIGURE 2–3
REV. 0

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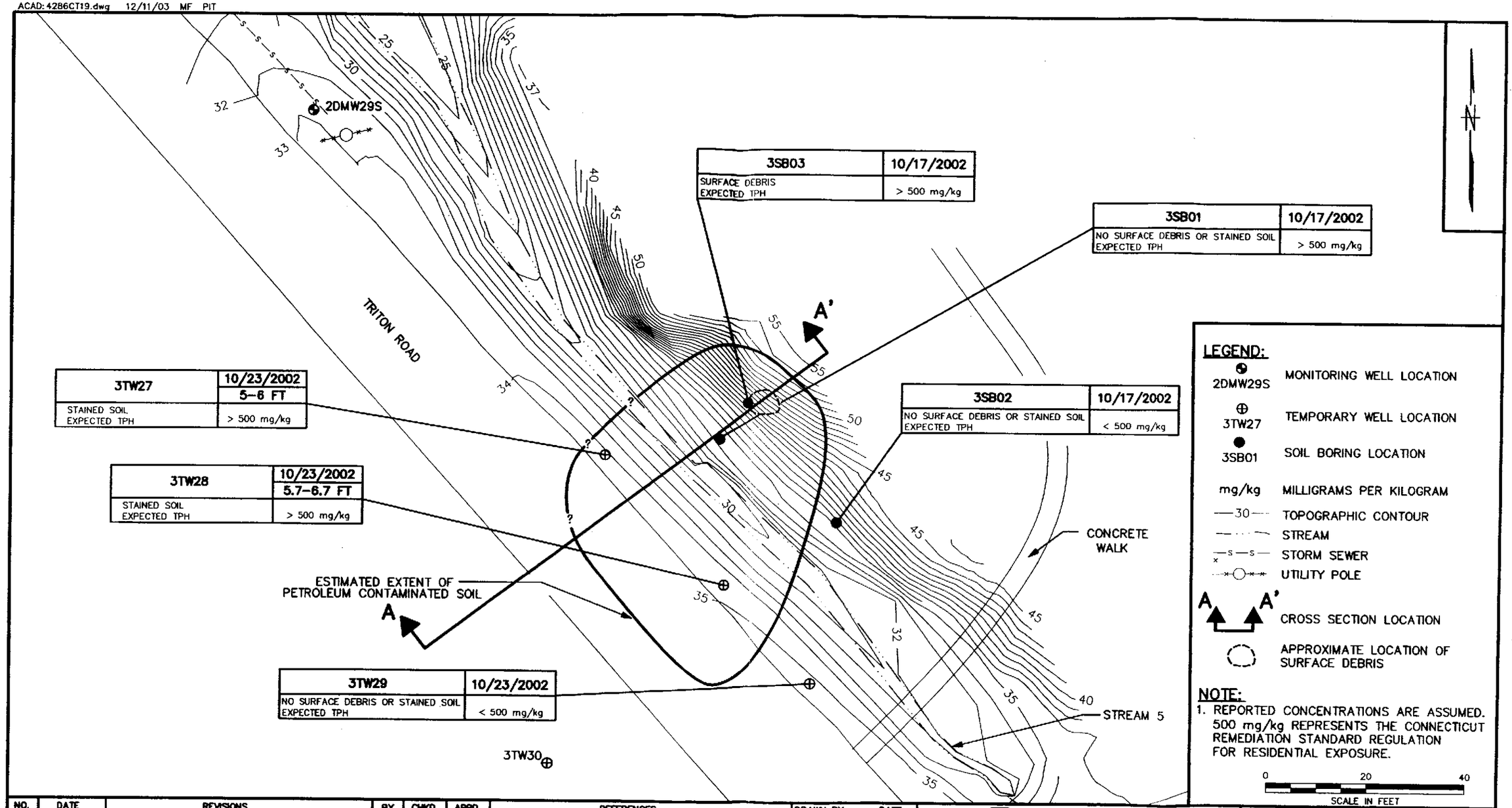

LEGEND:

- 2DMW29S — MONITORING WELL LOCATION
- 3TW27 — TEMPORARY WELL LOCATION
- 3SB01 — SOIL BORING LOCATION
- mg/kg — MILLIGRAMS PER KILOGRAM
- 30 — TOPOGRAPHIC CONTOUR
- STREAM
- STORM SEWER
- UTILITY POLE
- A A' — CROSS SECTION LOCATION
- APPROXIMATE LOCATION OF SURFACE DEBRIS

NOTE:

1. REPORTED CONCENTRATIONS ARE ASSUMED. 500 mg/kg REPRESENTS THE CONNECTICUT REMEDIATION STANDARD REGULATION FOR RESIDENTIAL EXPOSURE.

0 20 40
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DM DATE 12/11/03
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

ESTIMATED EXTENT OF SOIL CONTAMINATION
SITE 3 - NEW SOURCE AREA
NSB-NLON
GROTON, CONNECTICUT

CONTRACT NO. 4286 | OWNER NO. 0841
APPROVED BY CAR DATE 12/12/03
APPROVED BY DATE
DRAWING NO. FIGURE 2-4 | REV. 0

FORM CADD NO. TINUS_BH.DGN - REV 0 - 1/20/98

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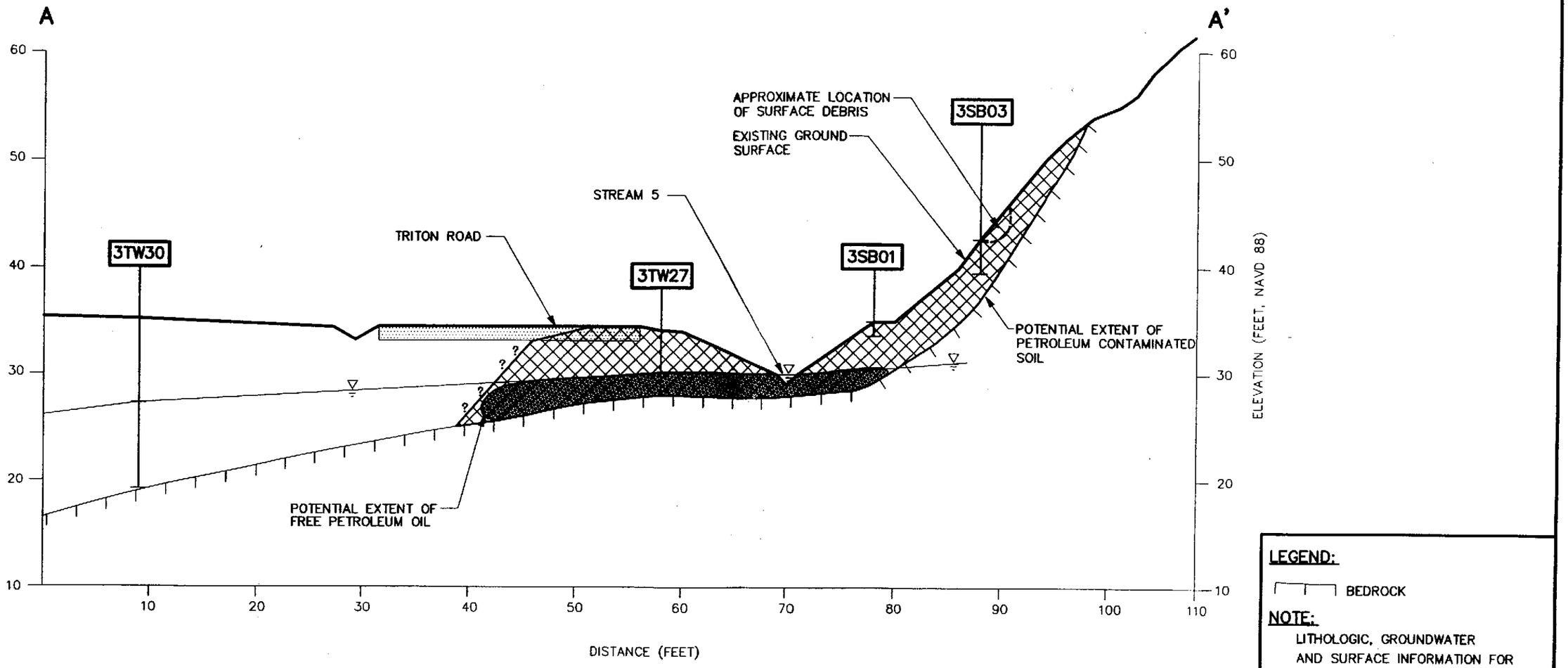

LEGEND:

BEDROCK

NOTE:

LITHOLOGIC, GROUNDWATER AND SURFACE INFORMATION FOR TEMPORARY WELLS 3TW30 AND 3TW27 ARE PROJECTED ONTO CROSS-SECTION

0 10 20

SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DATE: DM 12/11/03

CHECKED BY DATE:

COST/SCHED-AREA:

SCALE: AS NOTED

Tetra Tech NUS, Inc.

ESTIMATED EXTENT OF PETROLEUM CONTAMINATED SOIL
SITE 3 - NEW SOURCE AREA
NSB-NLON
GROTON, CONNECTICUT

CONTRACT NO. 4286 | OWNER NO. 0841

APPROVED BY: CAR DATE: 12/12/03

APPROVED BY DATE:

DRAWING NO. FIGURE 2-5 | REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

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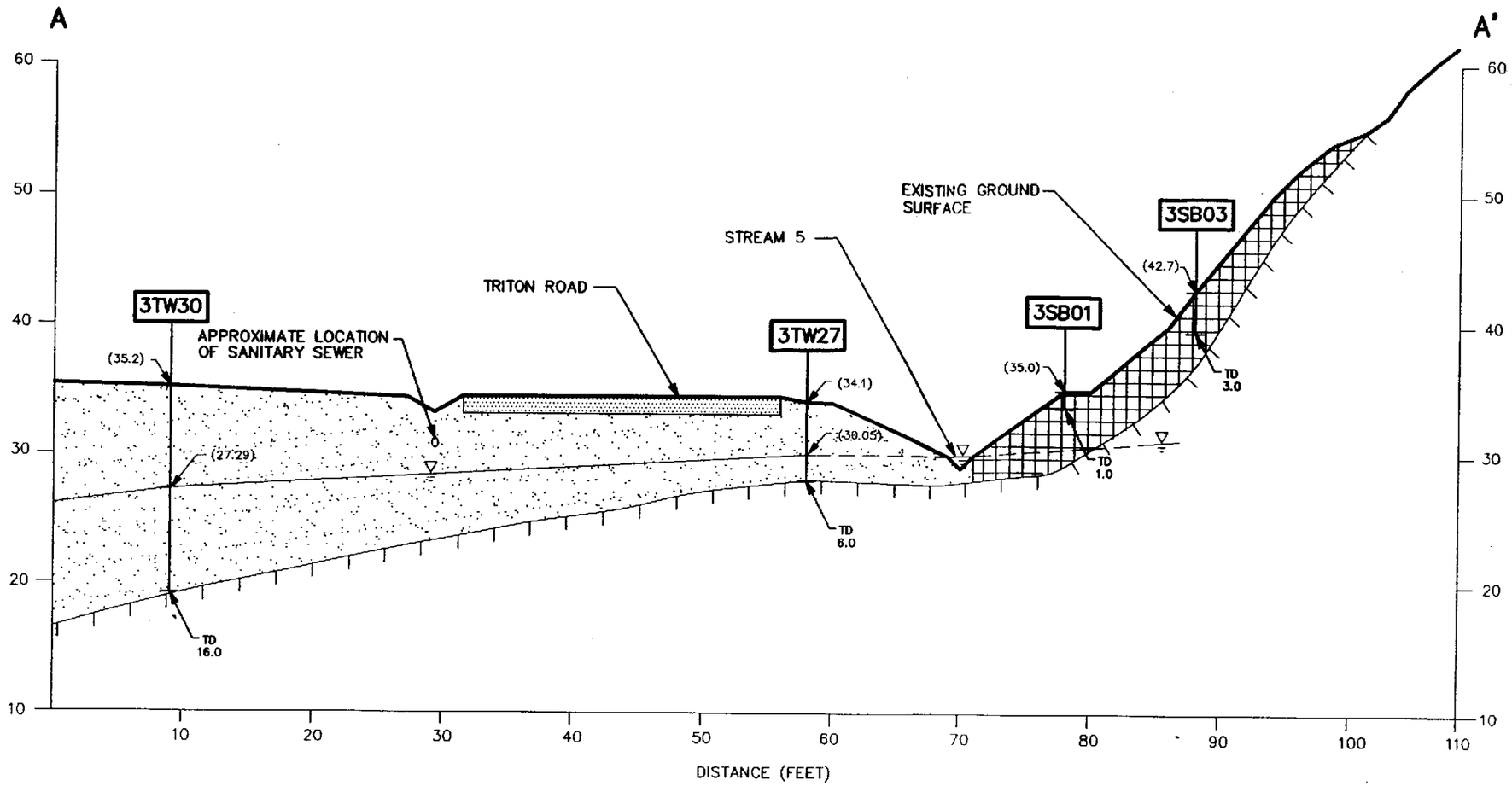


LEGEND:

- MONITORING WELL OR BORING NUMBER — 3SB03
- GROUND SURFACE ELEVATION — (47.2)
- GROUND SURFACE
- GROUNDWATER ELEVATION
- TOTAL DEPTH OF WELL OR BORING (FT BGS) — TD 3.0
- SILTY SANDY GRAVEL
- SILTY SAND WITH ROCK FRAGMENTS/ BOULDERS
- INFORMATION INFERRED
- BEDROCK
- ROAD
- WATER TABLE

NOTE:

LITHOLOGIC, GROUNDWATER AND GROUND SURFACE INFORMATION FOR TEMPORARY WELLS 3TW30 AND 3TW27 ARE PROJECTED ONTO CROSS-SECTION

0 10 20
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DATE: DM 12/11/03
CHECKED BY DATE:
COST/SCHED-AREA:
SCALE: AS NOTED

Tetra Tech NUS, Inc.

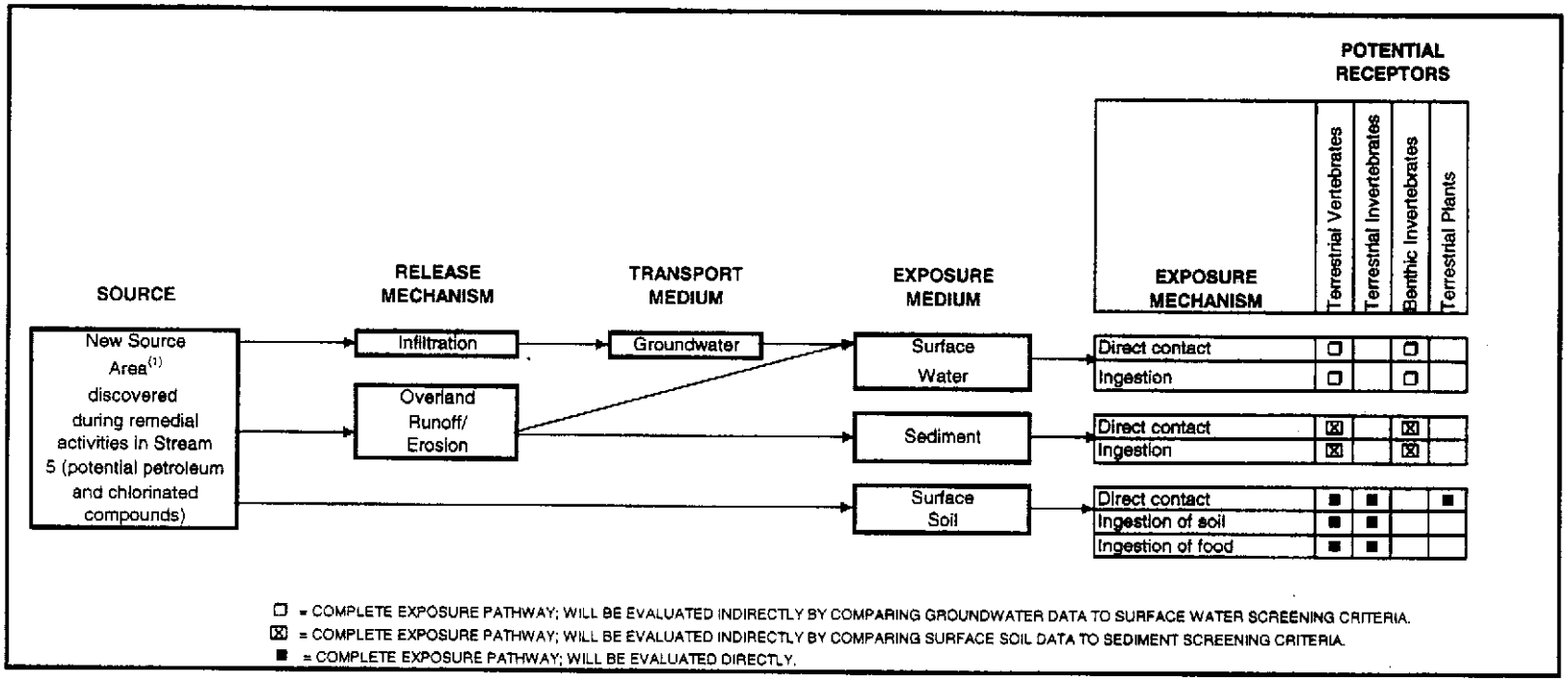
LITHOLOGIC CROSS-SECTION
SITE 3 - NEW SOURCE AREA
NSB-NLON
GROTON, CONNECTICUT

CONTRACT NO. 4286
OWNER NO. 0841
APPROVED BY: CAR
DATE: 12/12/03
APPROVED BY
DATE
DRAWING NO. FIGURE 2-6
REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

FIGURE 2-7

ECOLOGICAL CONCEPTUAL SITE MODEL
SITE 3 - NSA
NSB NLON, GROTON, CONNECTICUT



Blank space indicates incomplete exposure pathway or relatively insignificant, or not applicable potential exposure.

(1)New source area located adjacent to Stream 5 in Site 3 - Area A downstream watercourses.

3.0 RESPONSIVENESS SUMMARY

3.1 RESPONSIVENESS SUMMARY

The Responsiveness Summary is a concise and complete summary of significant comments received from the public and includes responses to these comments. In addition, this summary provides the decision makers with information about the views of the community. It also documents how the Navy and CTDEP considered public comments during the decision-making process and provides answers to significant comments. In accordance with the guidance in Community Relations in Superfund: A Handbook (EPA, 1992), the Responsiveness Summary was prepared after the public comment period, which ended on August 17, 2004.

3.2 OVERVIEW

The Proposed Plan (Navy, 2004), as presented to the public, identified NFA for Site 3 - NSA soil under CERCLA. NFA was recommended for Site 3 - NSA soil because petroleum contamination is excluded from CERCLA. The Navy's plan for addressing the petroleum-contaminated soil is provided in Appendix B.

3.3 BACKGROUND ON COMMUNITY INVOLVEMENT

The public comment period for the proposed action for Site 3 - NSA soil began on July 16, 2004 and ended on August 17, 2004. A public meeting was held on July 27, 2004 at the Best Western Olympic Inn on Route 12, Groton, Connecticut to accept verbal comments on the proposed action. No comments were received during the public meeting or comment period; therefore, no revisions to the proposed remedies were required.

3.4 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND NAVY RESPONSES

No comments were received during the public meeting or comment period on the proposed remedies for Site 3 - NSA soil.

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